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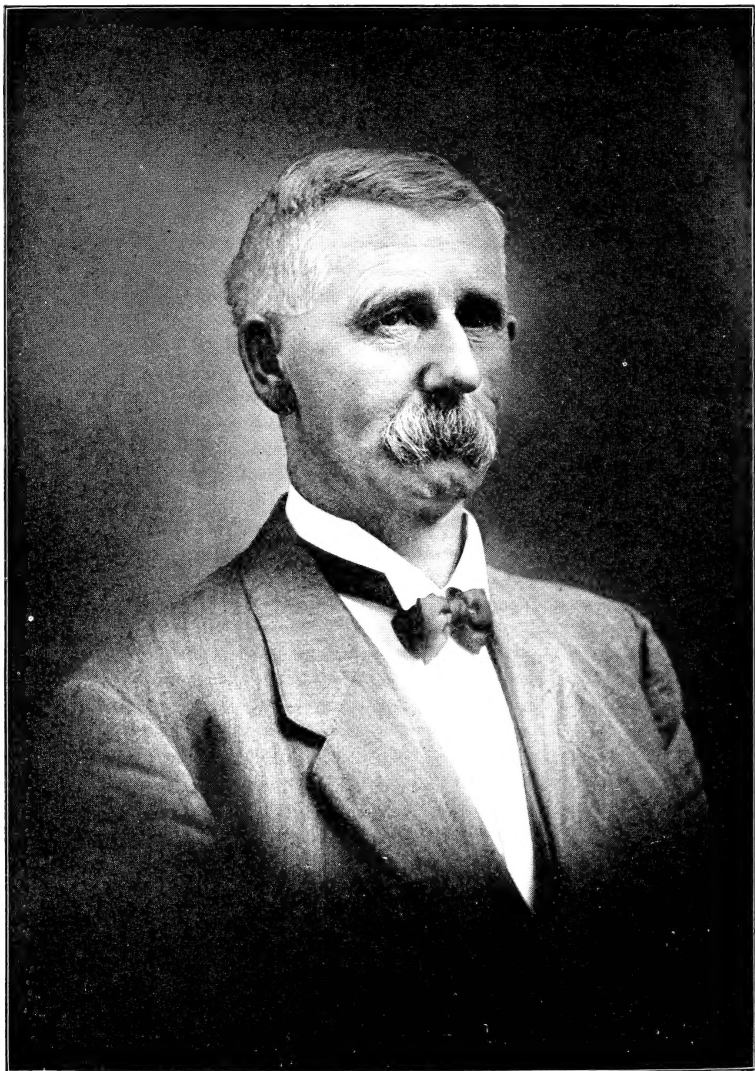
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J. P. Mason, Elgin, President State Dairymen's Ass'n.

FORTY-SECOND ANNUAL MEETING

OF THE

THE LIBRARY OF THE

AUG 3 1925

UNIVERSITY OF ILLINOIS

*ILLINOIS
STATE DAIRYMEN'S
ASSOCIATION*

HELD AT CARBONDALE, ILLINOIS

JANUARY 25, 26, 27

1916

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LETTER OF TRANSMITTAL.

Office of Secretary,
Illinois State Dairymen's Association,
Chicago, Ill., 1916.

To His Excellency, Edward F. Dunne, Governor of the State
of Illinois:

I have the honor to submit the official report of the Illinois
State Dairymen's Association, containing the addresses, papers,
and discussions at its forty-second annual meeting, held at Car-
bondale, Illinois, January 25, 26 and 27, 1916.

Respectfully,

GEO. CAVEN,

Secretary.

585295

LIST OF OFFICERS.

President—

J. P. MASON, Elgin.

Vice-President—

H. C. HORNEMAN, Watseka.

Directors—

J. P. MASON, Elgin.

H. P. IRISH, Farina.

J. B. NEWMAN, Elgin.

H. C. HORNEMAN, Watseka.

SIDNEY B. SMITH, Springfield

H. J. CREDICOTT, Freeport.

FRED ZIMMERMAN, Peoria.

Secretary—

GEO. CAVEN, Chicago.

Treasurer—

CHAS. FOSS, Cedarville.

BY-LAWS.

Officers

Section 1.—The officers of the Association shall consist of a President, Vice-President, Secretary, Treasurer and Board of Directors, composed of seven members, of whom the President and Vice-President of the Association shall be members and the President ex-officio Chairman.

Duties of the President

Sec. 2.—The President shall preside at the meetings of the Association and of the Board of Directors. It shall be his duty, together with the Secretary of the Board of Directors to arrange a program and order of business for each regular annual meeting of the Association and of the Board of Directors, and upon the written request of five members of the Association it shall be his duty to call special meetings. It shall be his further duty to call on the State Auditor of Public Accounts for his warrant on the State Treasurer, for the annual sum appropriated by the Legislature for the use of this Association, present the warrant to the Treasurer for payment, and on receiving the money receipt for same, which he shall pay over to the Treasurer of the Association, taking his receipt therefor.

Duties of the Vice-President

Sec. 3.—In the absence of the President his duties shall devolve upon the Vice-President.

Duties of the Secretary

Sec. 4.—The Secretary shall record the proceedings of the Association and of the Board of Directors. He shall keep a list of the members, collect all moneys due the Association

(other than the legislative appropriations), and shall record the amount with the name and postoffice address of the person so paying, in a book to be kept for that purpose. He shall pay over all such moneys to the Treasurer, taking his receipt therefor. It shall also be his duty to assist in making the program for the annual meeting and at the close of said meeting compile and prepare for publication all papers, essays, discussions and other matter worthy of publication, at the earliest day possible, and shall perform such other duties pertaining to his office as shall be necessary.

Duties of the Treasurer

Sec. 5.—The Treasurer shall, before entering on the duties of his office, give a good and sufficient bond to the Directors of the Association, with one or more sureties, to be approved by the Board of Directors, which bond shall be conditioned for a faithful performance of the duties of his office. He shall account to the Association for all moneys received by him by virtue of said office and pay over the same as he shall be directed by the Board of Directors. No moneys shall be paid out by the Treasurer except upon order from the Board, signed by the President and countersigned by the Secretary. The books or accounts of the Treasurer shall at all times be open to the inspection of the members of the Board of Directors, and he shall, at the expiration of his term of office, make a report to the Association of the condition of its finances, and deliver to his successor the books of account together with all moneys and other property of the Association in his possession or custody.

Duties of the Board of Directors

Sec. 6.—The Board of Directors shall have the general management and control of the property and affairs of the Association, subject to the By-Laws.

Four members of the Board shall constitute a quorum to do business.

The board of Directors may adopt such rules and regulations as they shall deem advisable for their government, and

may appoint such committees as they shall consider desirable.

They shall also make a biennial report to the Governor of the State of the expenditures of the moneys appropriated to the Association, and arrange the program and order of business for the same.

Election of Officers.

Sec. 7.—The President, Vice-President and Board of Directors shall be elected annually by ballot at the first annual meeting of the Association.

The Treasurer and Secretary shall be elected by the Board of Directors.

The officers of the Association shall retain their offices until their successors are chosen and qualify.

A plurality vote shall elect.

Vacancies occurring shall be filled by the Board of Directors until the following annual election.

Membership.

Sec. 8.—Any person may become a member of the Association by paying the Treasurer such membership fee as shall from time to time be prescribed by the Board of Directors.

Quorum

Sec. 9.—Seven members of the Association shall constitute a quorum for the transaction of business but a less number may adjourn.

Annual Assessment

Sec. 10.—One month prior to the annual meeting in each year the Board of Directors shall fix the amount, if any, which may be necessary to be paid by each member of the Association as an annual due.

Notice of such action must be sent to each member within ten days thereafter, and no member in default in payment thereof shall be entitled to the privileges of the Association.

Amendment of By-Laws

Sec. 11.—These By-Laws may be amended at any annual meeting by a vote of not less than two-thirds of the members present. Notice of the proposed amonedment must be given in writing, and at a public meeting of the Association, at least one day before any election can be taken thereon.



**Forty-Second Annual Convention Illinois
State Dairymen's Association, Held at
Carbondale, Illinois, January
25, 26, 27, 1916.**

**TUESDAY MORNING, JANUARY 25th, 1916,
10:30 A. M.**

The meeting was called to order by the President, Mr. J. P. Mason, of Elgin, presiding.

Invocation: Reverend Ellis M. Jones, of Carbondale.

"Let us stand while we pray. Heavenly Father, we are glad that we come into Thy presence at all times and under all circumstances and look to Thee for Thy help, guidance and blessing. Now, this is a very important meeting; we are here to be, and we shall be here for several days, seeking information. We want to know about this great work and this great business, and we pray for the light. Bless those who shall lead us and who shall instruct us, and bless us with the open mind; and may there come great good from this gathering for this great industry in our land and in our country, for Jesus' sake. Amen."

ADDRESS OF WELCOME.

Hon. E. K. Porter, Mayor of Carbondale

"Mr. President, Ladies and Gentlemen:

It is indeed with pleasure, Mr. President, that I welcome you and this Convention to Carbondale. I do not feel that it is of local interest wholly, but the entire district of Southern Illinois is honored by your coming amongst us.

A few years ago the State Legislature very wisely appropriated a small sum of money to start scientific farming at our State Normal University, and each successive Legislature has added a small sum to that amount. Now we have with us the Dairymen's Association which probably will add more to the wealth of Southern Illinois than any other movement on foot, if we can get dairying established as it is in the Northern and Central districts.

Our lands are not nearly as expensive as they are in those districts, and yet we have never applied the scientific methods of farming to the Southern lands as I feel we should do. I am convinced that every member that is within this hall who will pay close and strict attention to the discourses will be greatly benefited.

We gladly welcome you and I wish it might be so that you could establish permanently a convention of this kind in this end of the state. I thank you." (Applause.)

RESPONSE.

Mr. H. J. Credicott, Freeport

“Mr. President, Ladies and Gentlemen:

It gives me great pleasure, on behalf of the Illinois State Dairymen's Association, to thank the Mayor of the City of Carbondale for the welcome extended to our meeting.

The convention was brought to this part of the state because of a feeling that you needed the dairy business here. It is a business which develops the resources of the farm, which builds up the farm instead of tearing it down. It is a business which brings ready money,—it is a cash business, and there is nothing that will build up a community faster than the dairy business. You will find in old established communities where the dairy business has been in vogue for a number of years that the banks have larger deposits of money, that the farmers are prosperous, that there are but few mortgages on the farms and those you will find are usually placed there for the purpose of getting money to buy more dairy stock and extend the business.

One of the first things that usually comes up in a new country is the question of markets. They get to wondering if they produce dairy products on a large scale if they can find a market for it. I remember in Minnesota, my home state, when the dairy business was first started out there,—it was a grain farming proposition, wheat with a little corn, and the farmers were very dubious about the dairy proposition—they wondered if they produced lots of butter whether they would find a market for it. At the beginning when they were producing a good quantity and good quality they did have some trouble with their markets, but that is a thing that is easily smoothed out. This great country can consume all the dairy products that we can possibly produce. There may come times when it may look as if there is an over-

production, but they do not last long, and in the long run we find a ready market for all production. I should say that this present time is particularly good. Last season there was a slight over-production in some lines, but the war conditions in Europe has changed the condition, the condensed milk factories are hardly able to fill their orders, the cheese business is also brisk and everything points for a strong demand for dairy products for the coming year with good prices.

If the dairymen will go into the dairy business as a business, they will find in a short time that their lands will increase in fertility and values will go up in leaps and bounds. I can remember when you could buy land for \$50 or \$60 an acre in Minnesota; that same land today is selling for \$125 to \$150, and it is a hard matter to get farmers to let go at that figure, and it is the dairy business that has done that. It has again become fertile after it was depleted due to the constant wheat farming which preceded dairying. The biggest increase has come in the last five years because of the immigration of Illinois farmers who have gone up into that state and bought that land and gone into the dairy business on a larger scale.

It has been the history of the business, as it has developed all over the country, wherever farmers have gone into the dairy business, that community has become prosperous in a short time.

About three years ago I was on a trip through Southern Illinois, not as far south as this, and being interested in the dairy business I was looking things over rather closely and in driving past a farm I noticed a new barn and a new silo, quite a nice looking outfit, and out of curiosity I drove in. The farmer was working around his barn and I remarked that he was getting into the dairy business in pretty good shape. "Yes," he answered, "I am just trying it out. I got an idea watching my neighbors there might be some money in it, and decided I would try it out." "Is that the first you have done?" I asked him. Yes, he was going to try it. The man had put in a splendid outfit from the concrete silo, barn, stanchions and everything. Well, it was not going to cost him anything to try it out. "I raised corn and hogs and fed the corn to the hogs, and the hogs

paid for the cows, so you see it did not cost me anything to try the thing out," he told me. Still the man had the right idea, he was getting into a line of business that was going to pay him and I think if the truth was known we would find that man in a prosperous condition and his farm worth more money than it was before.

I hope, Mr. President, that we may arouse these farmers to go into the dairy business as a business, instead of a side issue."

President Mason Announces the Program.

We are opening up our Forty-Second Annual Meeting and we are where I think we are going to do some good, and we want everyone here to feel free to ask a question at any time on any phase of the Dairy business. What makes a meeting interesting is the discussion. We want to discuss all phases of it and you need the Dairy business down here in Southern Illinois. I have asked many men in the northern part of the state whether it would pay all the expenses and still pay a profit where land is held at \$125 to \$150 per acre, and they say it does. The earning capacity of land is what ought to govern its price. Get to growing alfalfa, clover and build silos and you can work up this farming business in Southern Illinois. You need it here and you need it bad.

I will tell you what Doctor Hopkins told in Wayne County one day, and you would not think that that exists in Illinois, some of you. You have been growing wheat and small grains until it has become unprofitable and you have got to quit. He said there were men on places not over twenty miles from where he stood, people so poor they could not put windows into their houses. The Dairy business will build up your soil and it is a business that pays all the year around.

We have been working, the officers and directors of this Association, and have done more this last year than before. We have held a great many meetings and I know we held about thirty-five meetings. Mr. Matthews, your State Pure Food Com-

missioner, arranged for meetings in Southern Illinois to try and get the business men and bankers interested in this movement, and I never saw such enthusiastic meetings, bankers and business men offering financial assistance. I don't know of any man who has done as good work and has been of greater service than Mr. Matthews has. The bankers are willing to take hold and that is why we are down here to try and push this matter along. Take hold of this convention and ask questions and bring out anything you can and get all the information you can out of it and feel free to do it. I don't want to take up any further time—but will announce the first speaker.



ECONOMIC PRODUCTION OF MILK.

By Charles Foss, Cedarville

Mr. Chairman, Ladies and Gentlemen:

There are three essentials to the economic production of milk. The first essential is good cows, cows that can take the crops we raise on our farms and convert them into milk and butterfat economically.

The cow is the market to which we sell our crops. The amount of money we will realize from our crops, which we feed to our cows, will depend upon the price we get for our milk and butterfat, and the ability of the cow to produce milk economically.

There are two ways in which we can increase the profits in the dairy business. One way is to get an increased price for our product and the other is to decrease the cost of production.

The dairyman has very little to say as to what he is to receive for his product. He generally gets what the market affords and no more. But it is entirely in his control to decrease the cost of production by having efficient cows.

The second essential is to feed the good cow a balanced ration. A proper ration for a cow must not only contain the right proportion of digestible protein, carbohydrates and fat, but it must also be light and bulky so it can be easily digested and it must be palatable so the cows will like it.

The third essential is proper care. A cow will not produce very much milk unless she is comfortable. A cow that is exposed to cold weather in winter or is compelled to drink ice water will require all her feed for fuel, to keep her body warm and will have little left for milk production.

The investigation that the University of Illinois has carried on for the last fifteen or sixteen years, goes to show that at least one-fourth of the cows in Illinois barely pay for the feed they

consume, while the best one-fourth of them return a profit of over \$30.00 per cow.

The fact is, that in nearly all herds there are some poor cows who are consuming the profits of the good ones, and thereby reducing the net profits of the entire herd. The thing to do is to weed out the boarders in the herd and replace them with good cows.

The question naturally arises: where are we going to get the good cows? If only one-fourth of all the cows in Illinois (or any other state) are really worth having it will be seen at once that there are not nearly enough good cows to go around. Good cows are seldom for sale and when they are for sale they command a premium. The most profitable way to get good cows is to raise them.

There are four distinct dairy breeds, viz.—Holstein, Jersey, Guernsey and Ayrshire breeds. Select the breed you like the best or the one best suited to your market and secure the best sire that you can get of that breed to head your herd. Keep a record of the production of each cow in the herd, by weighing the milk and testing it for butterfat. Sell the boarders to the butcher and raise the heifer calves from your best cows. In this way a very profitable herd can be secured in a few years, if along with good breeding you give your cows the right kind of feed and proper care.

When you have once decided what dairy breed you want, stick to that particular breed, do not change from one breed to another. There are some men who believe they can cross a Holstein with a Jersey and procure offspring that will give Holstein quantity and Jersey quality milk, while the facts in the case are, nine times out of ten, the direct opposite. The offspring will produce Jersey quantity and Holstein quality milk.

Since December, 1904, a record of the milk and fat production of each individual cow in my herd has been kept, the unprofitable cows have been sold to the butcher and the heifer calves from the best cows have been raised.

During the time three registered Hostein sires have been at the head of the herd.



in That City, January 26, 1916.



Taken in Front of New City Hall at Carbondale, Ill., Just Before the Wednesday Afternoon of the Convention in That City, January 26, 1916.

The following table estimated from creamery returns will show the average production of each cow in the herd before any individual records were kept:

Year	Av. lbs. milk per cow	Av. lbs. fat per cow
1900	3560	135
1901	4648	176
1902	4355	165
1903	5054	190

The cows in my herd during this period received only ordinary care, such as cows receive on most farms in Stephenson County. No attempt was made to feed a balanced ration.

Careful investigation by the Dairy Department of the University of Illinois on a large number of dairy farms in Illinois, show that cows producing from three to four thousand pounds of milk just pay for the feed they consume and leave nothing with which to pay labor, interest on money invested and rent of barn.

I was convinced that this was the case with my herd and in December, 1903, began to apply the remedy to secure a more profitable herd by weighing the milk and keeping a record of the production of each individual cow in the herd. I also began to study how to feed cows a balanced ration and provided better care with the following results:

Year	Av. lbs. milk per cow	Av. lbs. fat per cow
1904	5800	224
1905	7105	260
1906	8057	307
1907	8626	326
1908	7984	307
1909	8415	311
1910	8309	289
1911	9413	321
1912	9090	301
1913	8956	314

You will notice that the average production of the herd was increased in three years (1903-06) from five thousand pounds milk and one hundred ninety pounds fat to eight thousand pounds

of milk and three hundred seven pounds of fat. This was accomplished by selling off the unprofitable cows, feeding the good cows a balanced ration and by purchasing a few good cows. The cows during this period were mostly all mature cows. After 1906 about one-third of the herd consisted of two and three-year-old heifers.

The herd now not only pays for feed consumed, but also for all labor, interest on money invested, and rent of barn and a nice profit besides.

Value of a Good Sire

Cow No. 21	11289 lbs. milk and 380 lbs. fat
Dam	7614 lbs. milk and 246 lbs. fat
Increase	3675 lbs. milk and 134 lbs. fat
 Cow No. 32	 9603 lbs. milk and 335 lbs. fat
Dam	7614 lbs. milk and 246 lbs. fat
Increase	1989 lbs. milk and 89 lbs. fat
 Cow No. 17	 8912 lbs. milk and 361 lbs. fat
Dam	5970 lbs. milk and 270 lbs. fat
Increase	2942 lbs. milk and 91 lbs. fat
 Cow No. 24	 11199 lbs. milk and 397 lbs. fat.
Dam	8199 lbs. milk and 264 lbs. fat
Increase	3000 lbs. milk and 133 lbs. fat
 Cow No. 36	 10010 lbs. milk and 419 lbs. fat
Dam	6141 lbs. milk and 325 lbs. fat
Increase	3861 lbs. milk and 94 lbs. fat

The above figures go to show the value of a pure bred sire at the head of the herd. The daughters of these sires consume very little more feed than their dams did and yet they produce about three thousand pounds milk more than their dams. This increase is practically all profit.

It must, however, not be inferred from the foregoing that all the heifers sired by a pure bred sire will show so large an increase in production as these cows do. But by keeping a record of the production of each cow you can weed out the low producers and in time will have a very profitable herd.

Q. How often did you test the milk from those cows?

A. Once a month. We take a sample of milk for two days. If you are going to test the milk of any cow you must take more than one milking, for the percent. of butterfat in one milking may vary from the next, there may be a difference between morning and evening milk. We take samples two days, both night and morning so as to get an average sample so as to be fair. A cow might test 5 per cent butterfat in the evening and test 4 percent in the morning—you want to take the average.

Q. Did you use a pure bred sire for those thirteen years?

A. No, sir. When we began weighing and sampling the milk for each individual cow we placed a pure bred sire at the head of the herd.

Q. You used a pure bred sire?

A. Yes.

Q. How often do you think a cow ought to freshen?

A. Once a year; sometimes there will be thirteen months, sometimes eleven months, I aim to have them freshen once a year. These sheets are for twelve months and the cows are often dry six weeks, I believe the average cow should, and she should be well fed during that time so that she will be in good shape when she freshens.

Q. What do you think of a dry period of from two to four months?

A. That is a different proposition. When they want a cow to make a very large record for one week, thirty days, or a year, they usually have that cow stand dry for a long time.

Q. She usually will do better the longer she remains dry?

A. They usually let them stand dry for a long period and

fatten them up. They are "forced" records. It does not make any difference to the men who own them how much it costs them to do this because they get more for her offspring.

Q. Then is it wise for an ordinary man to buy a sire from a cow that makes such a record?

A. Yes, that does not hurt the sire.

Q. Would it be profitable?

A. Yes, sir.

Q. You recommend buying a sire from a cow that has produced a high record?

A. The high record does not make the sire any better. Here we have a choice between two sires. Here is one that has a dam with a high record, here is the other with a dam equally as good perhaps but she has never been tested out. That sire might be as good as this one only you don't know it. I believe every farmer ought to buy the best sire that he can afford to buy. These records are from Holstein cattle. With \$150 you can buy a Holstein sire that will work wonders on the grade of your cows. Common native cows bred to a pure bred sire will have a wonderful effect on the offspring, much more than the dam.

Q. You spoke a moment ago that you had two cows giving 9,000 and 7,000 pounds of milk, approximately, under the same circumstances and same feed. Don't some cows make a bigger record at one time or another?

A. One record will not do. These are averages here, that is why I bring to you the averages.

Mr. Mason: "I will appoint the following committees:

Membership Committee—H. C. Horneman, of Watseka; Elmer Mack, of Springfield; H. C. Sutherland, of Carbondale;

Jesse Sliger, of Effingham; L. N. Wiggins, of Springfield; J. R. Newberry, of Newton.

Resolution Committee—H. J. Credicott, of Freeport; E. T. Ebersol, of Champaign; H. P. Irish, of Farina.

We will now listen to an address on "The Dairy Sire," by Mr. H. C. Horneman, of Watseka. Mr. Horneman discussed the value of a pure bred sire in a herd. He had no prepared address and most of his time was used in answering questions.



TUESDAY, 1:30 P. M.

Mr. Mason: The meeting is called to order, gentlemen.

I take pleasure in introducing to you Mr. Wollin, chemist, who is connected with the Illinois State Food Department.

**TESTING OF MILK FOR ITS CONTENT OF BUTTER FAT
AND SOLIDS NOT FAT.**

By Andrew A. Wollin, Chemist, Illinois State Food Commission

Mr. Foss and Mr. Horneman in their talks this morning told you how herds of dairy cows could be built up in quality by selective breeding after introducing a thoroughbred sire into the herd. You were advised to save the calves from the best dams. But how are you to know the best dams? Will a knowledge of the quantity of milk the dam produces be sufficient? It may be in case you are producing milk for use as such, provided the breeding for quantity is not carried far enough to lower the quality below the standard set by the Illinois State Food Laws. However, if you are producing milk for butter manufacturing purposes, it is necessary to know the fat content of the milk as well as to know the amount of milk, for a cow which produces sixty pounds of three percent milk is producing no more value for you than the one producing forty-five pounds of four percent milk, except for the small additional amount of skim milk produced. And to know whether your cows are giving you a three or four percent milk, you should have the means within your command to test the milk by means of the Babcock test. There have been devised a number of color tests, and tests dependent on density, but they are very inaccurate and unreliable and should not be used. On the other hand, when the quantity of butter fat

present in milk can be determined so easily and so accurately as is the case with the Babcock test, there is no reason why a farmer should not know what kind of milk his cows are producing.

According to statements made this morning, twenty-five per cent of the cows of this state are not paying for their board. How about your cows? Are they included in this twenty-five per cent? Weigh and test your milk.

Cream separators, hand and power, have been known to get out of adjustment. The speed has not been correct, the bearings have become worn, the cream adjustment screw has slipped or one of a hundred other things has happened. Too high a percentage of fat is going into the skim milk. Maybe, it is your machine. How are you to know? Test your skim milk by means of a Babcock tester.

Unfortunately all men are not honest in their dealings. Some of the dishonest ones may be in the cream buying business. Cases have been known of a cream buyer over-reading the Babcock test to gain new customers and under-reading the test of old patrons, in order to even up. He stole from John to pay Harry. Is the man to whom you sell cream perfectly square with you? How are you to know? Test your cream by the Babcock way.

What is the Babcock test? What is the principle on which it is based? How is the work done. Is it possible for a farmer to test his cows by the method? These questions I will try to answer.

Milk, according to law, is the fresh, clean lacteal secretion obtained by the complete milking of one or more healthy cows, properly fed and kept, and contains not less than eight and one-half percent of solids not fat and not less than three percent of fat. No person, firm or corporation shall offer for sale, or sell to any person, firm or corporation, creamery or cheese factory, any unclean, unhealthy, unwholesome or adulterated milk or cream or any milk or cream which has not been well cooled or to which water or any foreign substance has been added, or milk or cream which has been handled or transported in unclean or unsanitary vessels or containers: Provided, that nothing in this section shall be construed to prevent the sale of skim milk to

factories engaged in the manufacture of skimmilk products, nor the sale of skimmilk when properly labeled ,etc. However, for the purpose of explaining the Babcock test let us consider Richmond's definition of milk. He states, "It is essentially a water solution of milk sugar, albumin and certain salts, holding in suspension small globules of fat, and in a state of semisolution, casein together with mineral matter." To gather together the small fat globules, which number millions to the drop, to measure their volume and thus to determine the percentage of butterfat is the object of the test. It is based on the treatment of a known quantity of milk with a definite volume of sulphuric acid of given strength in a glass bottle of special shape, with subsequent solution of the casein, heating of the mixtxure and liberation of the free fat. Then with the help of boiling water and a centrifuge the fat is gathered together in the narrow neck of the bottle, where its percentage is read directly from the special graduations on the neck.

The easiest way to explain this more in detail is to demonstrate the test step by step. In this work the quantities of milk and sulphuric acid used, the strength of acid used, and all other details have been carefully worked out and must all be carefully observed in order to obtain the best results.

Steps in Babcock test (demonstrated).

1. Mix the milk thoroughly.

This is best done by pouring from sample bottle into another bottle, or other suitable container, and back again several times. I am considering the milk in the sample bottle as being a representative sample from whatever source it may have come. The milk should be at a temperature of sixty to sixty-five degrees Fahrenheit.

2. Fill a 17.6 cubic centimeter pipette to the mark with milk.

This amount represents eighteen grams of milk or a little more than one-half an ounce. These special pipettes can be obtained from creamery supply houses, correctly marked.

The pipette is best filled in the following manner. Immerse the narrow end of the pipette in the well mixed sample of milk

and, with the mouth suck the air out until the milk rises in the pipette, above the mark on the neck. Quickly place the forefinger over the upper end of the pipette, before the milk runs below the mark. If the finger is dry, or nearly so, it is easy, by changing the pressure on the end of the tube to let the milk run out slowly and to stop at the exact mark. It is important that this amount be accurately measured.

3. Empty the pipette, without spilling any on the outside, into a Babcock test bottle.

This is the ordinary ten percent milk bottle, which can be obtained from any creamery supply house.

4. Add 17.5 cubic centimeters of sulphuric acid, of a specific gravity 1.825, from a measuring cylinder to the test bottle.

Both the measuring cylinder and sulphuric acid of correct strength can be obtained from supply houses.

5. Mix the acid and milk thoroughly by shaking the bottle.

6. Place the bottles in the centrifuge and whirl for five minutes.

The speed of whirling depends on the size of the centrifuge machine. Such directions always accompany the machine.

7. Add boiling hot water up to the base of the neck of the bottle and whirl again for two minutes.

8. Add boiling water until the fat rises into the neck of the bottle and whirl for one minute.

9. Read the percent of fat directly from the graduations on the neck of the bottle. And record results.

10. Empty the test bottles and wash thoroughly.

With a little experience anyone should be able to run this test and obtain just as accurate results as I have obtained here. Anyone should be able to do it. In a court case, in which I appeared as witness, a short time ago, I explained this process of the Babcock test as I have explained it to you. When I had finished the opposing attorney turned to the jury and said, "Gentlemen of the jury, this young man calls himself a chemist. He is paid by the state as a chemist to perform this simple task which can be performed by any old woman who has strength to turn a coffee mill." Maybe he is right. At least, anyone with

a little common sense and a little experience should be able to run a Babcock test.

I have tried to make these details clear. However, you will probably not be able to remember them. Do not let that worry you. The University of Illinois Agricultural Experiment Station has published a bulletin on just this subject, "Testing for Fat in Milk by the Babcock Test." Its number is circular No. 174. They will send it to you free, for the asking. A postal card will bring it to you. The bulletin will give you all the details of the work and tell you how to remedy any little troubles which may occur. It is better to follow the directions as they are given than to follow any which may be given in pamphlets furnished with testing machines.

Just a word in regard to testing outfits. A farmer can well afford to have a tester of his own. If he does not care to do this, he can probably arrange to buy a tester in co-operation with some neighbors of his. This is possible since a two-day test once a month is considered sufficient to determine the quality of milk a cow gives. In that way one farmer can use it and then pass is on to the next.

The size of the outfit would be determined by the size of herds to be tested. Four bottle machines, in which four tests can be made at one time, can be secured for five dollars and up, complete, ready to test milk. Such a four bottle machine would, in my opinion, be sufficiently large to test herds up to ten to fifteen cows in size.

In addition to the testing outfit, each farmer should have a milk scale, preferably one that reads in pounds and tenths of pounds instead of pounds and ounces. It should weigh up to thirty pounds and should have a loose index hand which could be so adjusted as to point to zero when the empty milk pail is hung on it. With such a scale, it would be easy to weigh each cow's milk every day with little effort and little loss of time.

Now with a record of how much milk a cow gives and what kind of milk it is, a farmer can start to follow out the suggestions given this morning on how to build up a better herd.

In the past, the importance and value of the solids not fat

of milk have not been properly recognized. The public seem to have been educated to look for butter fat in milk, to look for the cream line and to base their estimate of the value of the milk entirely upon its apparent richness. People seem to think that when the cream is removed there is nothing of value left. This was brought out unintentionally by a lawyer who cross-examined me in a case a short time ago. After I had showed that a certain man should be prosecuted because his milk fell below the state standard in solids not fat, this lawyer said, "Gentlemen of the jury, this young man is trying to frighten you with the high sounding term—solids not fat. Why, what are solids not fat in common every day terms? Nothing but common skimmilk clabber. It is of no value except to feed to calves and hogs. And now I ask you, why is it good to feed to calves and hogs?" Because it has nutritive value. Because it makes them grow. And the nutrients in it are of as much value to people as they are to those hogs and calves.

When you skim the fat from the milk, what is left is not water. It is water which has dissolved and suspended in it casein, milk sugar, albumin and certain mineral constituents, all of which are of greatest value as nutrients for the human body. These substances constitute what is known as solids not fat. These are materials that can be used for useful purposes in the production of heat and energy, in the building and repair of fibres and tissues and in the formation of the bony structure of the human body. That is why it is a fit food for hogs and calves, and that is why the public should learn to recognize skimmilk as a valuable material, for use as a drink and as a liquid to be used in cooking.

A recent government bulletin lays stress on the fact that the value of skimmilk has been underestimated and that more of it should be used in cooking. This bulletin states that there is usually enough fat in the ordinary diet from the lard, butter, oils, meats, etc., used and that in cheap meals it was usually protein that was lacking. Therefore, they recommend the use of skimmilk with its high protein, casein and albumin, content to make up for this lack. (Farmers' Bulletin No. 363, U. S. Dept. of Agriculture, Washington, D. C.)

With these facts being emphasized, and the value of solids not fat being known, the State Food Department intends to see that all milk contains the eight and one-half percent of solids not fat required by law. How are you to tell whether your milk tests up to this standard? This can be done by using what is known as a lactometer test in connection with the Babcock test.

A lactometer is a float with a graduated stem. The graduations are from 20 to 40. When this float is placed in milk, the bulb will be submerged, allowing only the stem to remain above the surface. If the milk is light, the bulb will sink far into the liquid leaving only a short portion of the stem exposed and the reading on the graduated stem will be low. On the other hand, if the milk is heavy, the bulb will not sink far into it and a long portion of the stem will show above the surface and give a correspondingly high reading.

Temperature also effects the depth to which this bulb will sink into the milk. Cold milk will give a higher reading, than the same milk if warm. For the sake of uniformity and convenience the temperature of 60 degrees Fahrenheit has been accepted as standard throughout the country. This does not necessarily mean the temperature must be exactly 60 degrees F. when the lactometer test is made, for the reading at any other temperature can be changed to what it would have been had the reading been taken at 60 degrees F. by means of Table I. Therefore, it is necessary when making a lactometer reading to record the temperature of the milk, also.

Knowing the lactometer reading and the percentage of butterfat, it is possible to calculate the percentage of solids not fat by the help of Table II.

Let us say, for example, that we have a milk which when tested by the Babcock test proved to contain 3.5 per cent of butterfat, and which gave a lactometer reading of 34 at 52 degrees F. What would have been the lactometer reading at 60 F. and what is the percentage of solids not fat?

First we will change the reading of 34 at 52 F. to what it would have been at 60 F. In the column of Table I marked "Temperature of Milk in Degrees Fahrenheit," we find the figure

52. Now we follow that line horizontally from left to right, until we reach the vertical column headed by the figure 34. At that point we find the figure 33, which tells us that our sample of milk would have had a lactometer reading of 33 had the reading been taken at 60 F.

Now we proceed to find the percentage of solids not fat. In column headed "Percent of Fat" in Table II, we find the figure 3.5. We follow across the page on a horizontal line until we come to the column headed 33. At this point we find the figures 8.96, which tells us that our milk contained approximately 8.96 percent of solids not fat. Since our milk contained 8.96 percent of solids not fat and 3.5 percent of fat, it is well within the limits set by law.

To a dealer, a buyer of milk, the lactometer reading alone is often of great value. It serves as a rapid method of testing milks to locate suspicious samples. Normal milks will have a lactometer reading of from 29 to 35 at 60 degrees F. If the normal lactometer reading is less than 29 at 60 degrees Fahrenheit one of two things may be assumed.

1. That the milk contains an unusual amount of cream. Cream is lighter than milk. A large quantity of it will therefore form a light milk, with the corresponding low lactometer reading. Whether or not this unusual amount of cream is present can be determined by the Babcock test.

2. That the milk has been watered. Water, like cream, is lighter than milk, so that an excessive amount will give a light milk with a low lactometer reading.

If the reading of the lactometer is higher than 35 at 60 degrees Fahrenheit and the amount of fat as found by the Babcock test is low, it is safe to assume that the milk has been skimmed, as skim milk is heavier than whole milk.

I have tried to cover a great many points in a short time and have tried to make myself clear. If, however, there is anything about which you are in doubt, or if you have any questions to ask, I will be glad to answer them.

TABLE NO. 2.
For finding solids not fat in Milk.

% fat	Lactometer reading at 60° F.										
	26	27	28	29	30	31	32	33	34	35	36
				Solid not fat							
.0	6.50	6.75	7.00	7.25	7.50	7.75	8.00	8.25	8.50	8.75	9.00
.1	6.52	6.77	7.02	7.27	7.52	7.77	8.02	8.27	8.52	8.77	9.02
.2	6.54	6.79	7.04	7.29	7.54	7.79	8.04	8.29	8.54	8.79	9.04
.3	6.56	6.81	7.06	7.31	7.56	7.81	8.06	8.31	8.56	8.81	9.06
.4	6.58	6.83	7.08	7.33	7.58	7.83	8.08	8.33	8.58	8.83	9.08
.5	6.60	6.85	7.10	7.35	7.60	7.85	8.10	8.35	8.60	8.85	9.10
.6	6.62	6.87	7.12	7.37	7.62	7.87	8.12	8.37	8.62	8.87	9.12
.7	6.64	6.89	7.14	7.39	7.64	7.89	8.14	8.39	8.64	8.89	9.14
.8	6.66	6.91	7.16	7.41	7.66	7.91	8.16	8.41	8.66	8.91	9.16
.9	6.68	6.93	7.18	7.43	7.68	7.93	8.18	8.43	8.68	8.93	9.18
1.0	6.70	6.95	7.20	7.45	7.70	7.95	8.20	8.45	8.70	8.95	9.20
1.1	6.72	6.97	7.22	7.47	7.72	7.97	8.22	8.47	8.72	8.97	9.22
1.2	6.74	6.99	7.24	7.49	7.74	7.99	8.24	8.49	8.74	8.99	9.24
1.3	6.76	7.01	7.26	7.51	7.76	8.01	8.26	8.51	8.76	9.01	9.26
1.4	6.78	7.03	7.28	7.53	7.78	8.03	8.28	8.53	8.78	9.03	9.28
1.5	6.80	7.05	7.30	7.55	7.80	8.05	8.30	8.55	8.80	9.05	9.30
1.6	6.82	7.07	7.32	7.57	7.82	8.07	8.32	8.57	8.82	9.07	9.32
1.7	6.84	7.09	7.34	7.59	7.84	8.09	8.34	8.59	8.84	9.09	9.34
1.8	6.86	7.11	7.36	7.61	7.86	8.11	8.36	8.61	8.86	9.11	9.37
1.9	6.88	7.13	7.38	7.63	7.88	8.13	8.38	8.63	8.88	9.13	9.39
2.0	6.90	7.15	7.40	7.65	7.90	8.15	8.40	8.66	8.91	9.16	9.41
2.1	6.92	7.17	7.42	7.67	7.92	8.17	8.42	8.68	8.93	9.18	9.43
2.2	6.94	7.19	7.44	7.69	7.94	8.19	8.44	8.70	8.95	9.20	9.45
2.3	6.96	7.21	7.46	7.71	7.96	8.21	8.46	8.72	8.97	9.22	9.47
2.4	6.98	7.23	7.48	7.73	7.98	8.23	8.48	8.74	8.99	9.24	9.49
2.5	7.00	7.25	7.50	7.75	8.00	8.25	8.50	8.76	9.01	9.26	9.51
2.6	7.02	7.27	7.52	7.77	8.02	8.27	8.52	8.78	9.03	9.28	9.53
2.7	7.04	7.29	7.54	7.79	8.04	8.29	8.54	8.80	9.05	9.30	9.55
2.8	7.06	7.31	7.56	7.81	8.06	8.31	8.57	8.82	9.07	9.32	9.57
2.9	7.08	7.33	7.58	7.83	8.08	8.33	8.59	8.84	9.09	9.34	9.59
3.0	7.10	7.35	7.60	7.85	8.10	8.36	8.61	8.86	9.11	9.36	9.61
3.1	7.12	7.37	7.62	7.87	8.13	8.38	8.63	8.88	9.13	9.38	9.64
3.2	7.14	7.39	7.64	7.89	8.15	8.40	8.65	8.90	9.15	9.41	9.66
3.3	7.16	7.41	7.66	7.92	8.17	8.42	8.67	8.92	9.18	9.43	9.68
3.4	7.18	7.43	7.69	7.94	8.19	8.44	8.69	8.94	9.20	9.45	9.70
3.5	7.20	7.45	7.71	7.96	8.21	8.46	8.71	8.96	9.22	9.47	9.72
3.6	7.22	7.48	7.73	7.98	8.23	8.48	8.73	8.98	9.24	9.49	9.74
3.7	7.24	7.50	7.75	8.00	8.25	8.50	8.75	9.00	9.26	9.51	9.76
3.8	7.26	7.52	7.77	8.02	8.27	8.52	8.77	9.02	9.28	9.53	9.78
3.9	7.28	7.54	7.79	8.04	8.29	8.54	8.79	9.04	9.30	9.55	9.80
4.0	7.30	7.56	7.81	8.06	8.31	8.56	8.81	9.06	9.32	9.57	9.83
4.1	7.32	7.58	7.83	8.08	8.33	8.58	8.83	9.08	9.34	9.59	9.85
4.2	7.34	7.60	7.85	8.10	8.35	8.60	8.85	9.11	9.36	9.62	9.87
4.3	7.36	7.62	7.87	8.12	8.37	8.62	8.88	9.13	9.38	9.64	9.89
4.4	7.38	7.64	7.89	8.14	8.39	8.64	8.90	9.15	9.40	9.66	9.91
4.5	7.40	7.66	7.91	8.16	8.41	8.66	8.92	9.17	9.42	9.68	9.93
4.6	7.43	7.68	7.93	8.18	8.43	8.68	8.94	9.19	9.44	9.70	9.95
4.7	7.45	7.70	7.95	8.20	8.45	8.70	8.96	9.21	9.46	9.72	9.97
4.8	7.47	7.72	7.97	8.22	8.47	8.72	8.98	9.23	9.48	9.74	9.99
4.9	7.49	7.74	7.99	8.24	8.49	8.74	9.00	9.25	9.50	9.76	10.01
5.0	7.51	7.76	8.01	8.26	8.51	8.76	9.02	9.27	9.52	9.78	10.03
5.1	7.52	7.78	8.03	8.28	8.53	8.79	9.04	9.29	9.54	9.80	10.05
5.2	7.55	7.80	8.05	8.30	8.55	8.81	9.06	9.31	9.56	9.82	10.07
5.3	7.57	7.82	8.07	8.32	8.57	8.83	9.08	9.33	9.58	9.84	10.09
5.4	7.59	7.84	8.09	8.34	8.60	8.85	9.10	9.36	9.61	9.86	10.11
5.5	7.61	7.86	8.11	8.36	8.62	8.87	9.12	9.38	9.63	9.88	10.13
5.6	7.63	7.88	8.13	8.39	8.64	8.89	9.15	9.40	9.65	9.90	10.15
5.7	7.65	7.90	8.15	8.41	8.66	8.91	9.17	9.42	9.67	9.92	10.17
5.8	7.67	7.92	8.17	8.43	8.68	8.94	9.19	9.44	9.69	9.94	10.19
5.9	7.69	7.94	8.20	8.45	8.70	8.96	9.21	9.46	9.71	9.96	10.22
6.0	7.71	7.96	8.22	8.47	8.72	8.98	9.23	9.48	9.73	9.98	10.24

RELATION OF FEEDS TO SOLIDS IN MILK.

R. S. Hulce, University of Illinois.

More or less trouble is experienced each year by a number of dairymen when they find that the milk that their herd is producing is illegal because it does not come up to the state standard in content of solids. To get the matter promptly before you a statement should be made explaining the state requirements for milk solids.

The definition of milk as stated by the State Food Commission in its report for 1914 is as follows: "Milk is fresh, clean lacteal secretions obtained by the complete milking of one or more healthy cows, properly fed and kept, excluding that obtained within fifteen days before and ten days after calving, and containing not less than $81\frac{1}{2}$ percent of solids not fat and not less than 3 percent of butterfat." The same report of the State Food Commission states that 50 of the 436 samples of milk examined that year were found to be illegal. Thirty-one of the 50 contained less than $81\frac{1}{2}$ percent of solids not fat, and fifteen contained less than 3 percent of fat. Average milk contains, according to Babcock about 9.14 percent of solids not fat and 3.69 percent of solids fat.

I propose to take up briefly certain factors such as the effect of breed and lactation on the composition of milk, and then discuss the effect on it of feed and of the influence of the physical condition of the cow. Taking up the question of breed, the average composition of the milk of any one of the dairy breeds is distinct from that of any other. The average solid content of the milk for a year of the pure bred animals representing the dairy breeds at the University of Illinois is as follows.

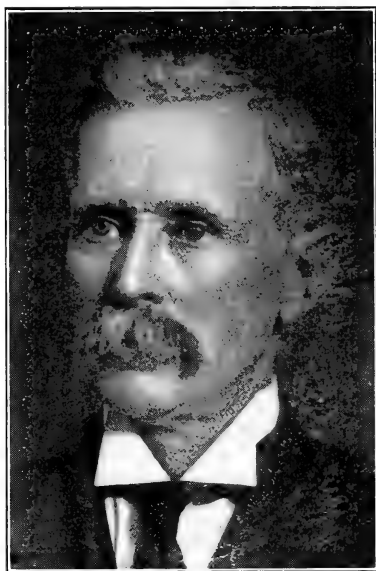
Breed—	Percent of fat	Percent of solids not fat
Jerseys	5.24	9.56
Guernseys	4.87	9.02
Ayrshires	4.20	8.70
Holsteins	3.40	8.60



E. K. Slater, LaGrange, Ill., with
Blue Valley Creamery Co.



R. S. Hulce, University of
Illinois.



Mr. H. P. Irish, Farina, Ill., Dairy
Farmer and a Director of Illinois
State Dairymen's Association.

UNIVERSITY OF CALIFORNIA

These figures give a general idea of the differences existing in the average composition of the milk of the dairy breeds. Analyses of the milk of the various breeds indicates that the albumin content does not seem to vary with breed, but that the casein is highest in milk rich in butterfat. The various breeds of dairy cattle have been bred for years with certain purposes in mind until now if one desires quantity of milk at the expense of solids or vice versa he may know which breed to choose, having in mind the fact that there are certain families and individuals of each breed which produce milk differing markedly in composition from the average for the breed.

The second point that I propose to mention is the variation in the composition of milk due to lactation. The milk from all cows does not show the same variations due to the effect of lactation since much depends upon the individuality of the cow and the condition she is in. Data which has been tabulated shows that as a rule the percent of solids in milk are higher at the beginning and at the end of lactation than during the intervening period.

Bearing in mind that the average composition of milk varies with different breeds, as well as with individuals of the breed, and with the stage of lactation, let us consider feed as a factor in causing variation in the composition of milk. At one time it was generally believed that the constituents in the feeds eaten by cows were with little change secreted into the milk, and this led to the belief that the fat content of milk could be made to vary by changing the nature of the feeds. Some interest was aroused in this idea by Kuhn, a German investigator, who fed palmnut cake meal in the ration of three milch cows and obtained data which seemed to indicate that the fat content of the milk was appreciably raised. This, together with the fact that many farmers believed that the fat content of milk could be made to vary with certain combinations of feeds, has led to the accumulation of a vast amount of data on the subject. Unfortunately, a considerable amount of evidence was based upon data taken from brief feeding periods or from individual cows which experienced a variation in the composition of their milk not

caused by the ration. Evidence on the effect of feeds on the composition of milk should be based on extended feeding trials and not on brief periods of a few weeks, as a temporary effect on the composition of milk of a change of ration may be due to the stimulation of the change in diet regardless of the nature of the change.

To show that milk fat is not entirely dependent on the fat content of the feed Dr. Jordan and others conducted some experimental work at the New York Geneva Station on this subject, one part of which I shall mention. They fed a cow for 71 days on a ration very poor in fat. During that time the cow gave 39 pounds more of fat in her milk than the fat and protein contents of the ration could have furnished, and in addition she gained 15 pounds in live weight. The 39 pounds more of fat than the fat and the protein of the ration could have supplied must have come directly or indirectly from the carbohydrates of the ration.

In bringing out the fact that milk fat production is more or less independent of food fat in the feed I would not have you lose sight of the fact that it has long been known that certain feeds in a ration tend to affect the melting point of the butterfat produced. The writer has observed that a grain ration made up of 50 percent of either oil meal or of soy bean meal when fed to dairy cows produced butterfat which was softer and melted more readily than the butterfat produced by cows fed the regular herd ration. The butterfat produced by cows on green pasture has a lower melting point than that produced by cows on the ordinary winter ration. It is generally recognized that cotton seed meal fed to a dairy cow has a tendency to raise the melting point of the butterfat produced. These facts are interesting, but let us consider the relation of the ration to the percentage composition of the milk produced as far as the solids are concerned.

Extended experiments on the influence of feed on the composition of milk have been conducted in Denmark, and the results of the work are especially valuable because of the many animals that were included. Woll states that as a result of ten years of

investigational work by the Copenhagen Station: "The changes made in the character of the feeds of the cows included in the experiments have had no appreciable influence on the chemical composition of the milk produced." The work included comparisons of roots, grains, and oil cakes of various soils, and more than two thousand cows were included in the investigation.

The Massachusetts Station has done a considerable amount of work on the effect of food on the composition of milk. The Twentieth Report of the Massachusetts Station states that neither linseed, cotton seed, soy bean nor corn gluten meal had any pronounced lasting effect on the composition of the milk produced. Linseed oil fed in considerable quantities increased the fat content of the milk temporarily, the milk returning to normal in four or five weeks. Cotton seed oil, soy bean oil, and corn oil gave similar results. At the Illinois Station soy bean meal had a greater tendency than oil meal to raise the percent of the fat in milk.

The Wisconsin station found as a result of feeding rations fairly high in protein that the percent of fat in the milk produced averaged for three years 0.07 percent higher in butterfat content than the average percent during six years when a smaller amount of protein was included. At the Illinois Station a group of cows fed for 18 weeks on a ration low in protein declined 0.36 percent in the test of milk produced, while another group fed a balanced ration, that is one containing more protein, decreased 0.13 percent in the test of the milk. There was 0.2 percent greater decrease in the ration low in protein. If time permitted other data could be cited, but in general the conclusions would be the same, namely, that a goodly amount of protein in the feed has a slightly stimulating effect on production.

Having touched upon the effects of breed, stage of lactation, and certain concentrates on the composition of milk, let us now consider the effect of pasturing. The effect of pasturing on the composition of milk varies. Changing cows from winter feeding to pasture usually causes a rise in the solid content of the milk. This rise continues for a few weeks, after which

time the milk produced returns to its original solid content. As the pasturing season advances the effect on the composition of milk will depend largely upon how nearly the pasture maintains the cow and furnishes in addition food sufficient for the amount of milk being given. In looking over our records I find that the effect of giving four cows, having been fed a ration of alfalfa hay and corn silage, access to rye pasture for three weeks is as follows:

Average Percent of Fat in Milk.

Three weeks before turning into pasture	Three weeks on pasture	Three weeks again on dry feed
3.16%	3.35%	3.11%

A heavy producing cow if fed no grain in addition to pasture will in time draw upon her body weight, and a lowering of the percent of solids may result. Again, during a period of drought when cows are subjected to a partial starvation diet the solid content of the milk has been known to become lowered. During July and August, which were the dry months of a pasturing season, the milk from herds sending to creameries in New York lowered in fat as well as solids not fat.

It is the writer's belief after studying the data at hand that the important point in connection with pasturing is whether or not the pasture furnishes enough feed to keep the cow from losing weight in addition to supplying food for milk production. There are several instances which indicate that it is the physical condition of the cow that affects the solid content of the milk. Analyses made of many samples of milk coming to creameries in Sweden show that from January until spring the solids in the milk tend to lower, which is due to the fact that the winter feed supply is usually exhausted in January, and from that time on the cows depend largely on old hay stacks as a source of feed.

The effect of silage on the composition of milk has been observed in several instances. Reports have indicated that silage in the ration as compared with dried fodder plus the corn tended to raise the fat content of the milk slightly. Such a comparison

at the University of Illinois by three months' periods gave the following results. Grade Holstein cows were used:

Lot I.

	Percent fat	Percent solids not fat
Period I—Silage in ration	3.38	8.34
Period II—Stover and corn ration..	3.28	8.41

Lot II.

Period II—Stover and corn in ration	3.28	8.41
Period II—Silage in ration	3.05	8.36

There seems to be a slight tendency for milk higher in fat to be produced on the ration containing silage. Emphasis should not be given, however, to such a small variation.

Eckles of the Missouri Station found that cows freshening in a fleshy condition produce milk richer in butterfat for a time after freshening than when they freshen in a thin condition. Observations which we have made indicate the same thing, namely; the physical condition of the cow seems to have an influence upon the solid content of the milk she produces.

The following data is taken from Missouri Bulletin No. 100:

Percent of Fat in Milk by Months

Months	Average of 7 cows Fat at freshening	Normal at freshening	Average of 8 cows Thin at freshening	Normal at freshening
1	4.8	4.5	4.0	4.6
2	4.7	4.4	3.9	4.5
3	4.7	4.3	4.3	4.8
4	4.8	4.3	4.8	4.7
5	4.9	4.4	4.7	4.9
6	4.7	6.1	4.9	5.1

The University of Illinois has a cow in its grade dairy herd which for any one year has never produced milk that would come up to the legal requirements in solids. Her average production for three years was 2.77 percent of fat and 8.14 percent of solids not fat. During this time she has been kept in good physical condition and the changes in ration have not resulted in raising the quality of her milk.

In summing up the effect of feed on the composition of milk we must conclude that only indirectly does the ordinary ration have any material effect. As long as a cow is well nourished the solid content of the milk she produces will not be lowered. If the feed, either because of its character or its insufficient amount, does not properly supply the body of the animal and she is forced to draw upon the substance of her tissues to too great an extent the solids of the milk produced will be lowered. In other words, dairy cows which normally produce milk low in solids should be kept in fairly good physical condition if a further lowering in the solid content of their milk is to be avoided.



RESTORING AND RETAINING SOIL FERTILITY.

By Cyril G. Hopkins, University of Illinois.

I think that you will agree with me that we have no more important subject than the productive power of the soil. There are important uses to be made of the crops produced, and one of them is for dairy purposes, but if we do not produce the crops from the soil, then we will not succeed in any kind of farming, whether it be dairy farming, beef production, hog raising, grain farming, or any other kind; so this subject that we are to discuss this afternoon is really the most basic one in all agriculture, and I think you will pardon me, those of you who know parts of what I am going to say, if I first discuss briefly certain fundamental things required for the production of crops.

We think more about the feeding of animals than of plants, but food for plants is just as important as for animals; and in a way plants are more dependent upon being properly fed than animals, because at least a part of the year animals have some sort of privilege to wander about and gather their own food, while plants have not such opportunity—they “must stand and take it.”

There are ten different things required to produce a corn plant. I think everyone who has anything to do with the growing of corn should be familiar with the things which corn requires. It so happens that two of these essential materials for the production of crops come from the air, they are carbon and oxygen in form of carbon dioxide. So long as the wind blows over the field the supply of carbon dioxide will be provided by nature. A third, hydrogen, is supplied by water absorbed by the roots, while the carbon and oxygen are taken in through the pores in the leaves. Those three produce sugar and starch and most of the materials that are contained in butter, but there are seven other elements also essential, one of which is nitrogen, without which you cannot make casein, cannot make any muscle

or vital organs in the animal body. Phosphorus is another element. There is not a living cell in either plant or animal without phosphorus. Calcium, magnesium, potassium, iron and sulphur are all essential for the production of crops, and if any one of these elements is lacking, you cannot produce a grain of wheat, an ear of corn, or a spear of grass, so I think we surely ought to know about these basic substances out of which our crops are made. Carbon, oxygen and hydrogen are supplied by the air and water, and it so happens that the soil furnishes iron and sulphur in abundance, but there are five elements which remain to be considered and to which man must give attention. You might say that God provides five of the elements, one-half of the things out of which we make our crops, and He has evidently left it for man to provide five, so that man may labor together with God.

The supply of nitrogen is in the air. Over every acre of land there is enough nitrogen to produce 100 bushels of corn a year for 500,000 years. We don't need to buy nitrogen to grow corn; it is in the air and there are certain plants that can get it called legumes. All of those legume crops, if they have the proper bacteria associated with them on their roots, have power to get nitrogen from the air. These plants do not have the power in themselves, it is only when they have the bacteria on their roots, and if you are going to introduce a new kind of legume crop, like alfalfa, then the importance of inoculation comes in—we put in the bacteria that gives the plant that power. If you raise as much as seven tons to the acre, given that bacteria, alfalfa will consume 350 pounds of nitrogen during the season. What do you suppose it would cost if you went to buy it? Twenty cents a pound anyway, and there is fifty pounds of nitrogen in a ton of alfalfa. You will see at once, if we can raise legume crops we get free nitrogen in abundance, and we can use our money to better advantage than buying nitrogen. You may raise clover and feed it to dairy cows and another man might feed it to beef animals, but don't think that another man is a soil robber if he raises clover seed and sells it. Clover and grass seeds are perhaps even better products to sell from the farm than milk and meat.

From our farm which is located down here in Egypt, this last year my brother hauled to market a seed crop, and for one wagonload of seed he got \$340.95. You don't get so much per pound for your live stock as he got for redtop seed which is produced in Southern Illinois perhaps more than any other place in the United States. The production of redtop seed, timothy seed, clover seed, eac., should be encouraged.

The soil does not contain limestone in Southern Illinois and yet limestone is one of the things that we must have in the soil if we are going to grow the legume crops successfully. Some of them will grow fairly well without limestone, but clover will not, sweet clover will not, and alfalfa will not, and those are the most valuable of the legumes, because you sow them once and they hold their place for two years or more under normal conditions. Clover may be seeded one spring with wheat or oats or timothy and the next year it is up and growing just as soon as the snow is gone, and early in June you may be cutting a crop of hay; sometimes a second cutting is secured, or some fall pasture. You must know the value of clover as compared with cow peas. It costs about as much to prepare the soil for cow peas as for corn. You harvest one crop, the frost comes and it is gone. You won't find people growing cow peas where they can grow clover successfully, except when clover crops fail in time of drought.

Of course, the man who sells grain should also get his nitrogen from the air. He can then feed his clover to his wheat or corn, or other grain crops, if he chooses, by plowing under the clover; but, as a rule, I think there is more profit in feeding to the live stock. However, some men can be successful in the production of grain crops even if they don't know that an animal is sick until it is dead. They are not stock men.

If we put limestone upon the land it will add calcium, another element of plant food, besides helping clover to get nitrogen from the air. Calcium will be added to the soil with any limestone. If we need magnesium also, we use dolomitic limestone which is abundant in Illinois. That leaves us only two elements—phosphorus and potassium. Our most common soils contain about 800 pounds of phosphorus and thirty thousand of

potassium in the plowed soil of an acre. We have a pretty good supply of potassium in our soil, but we must add phosphorus unless the soil erodes so that the subsoil keeps coming to the surface; the subsoil is just as rich in phosphorus as the top soil. In one way erosion is not an unmixed evil although we lose valuable organic matter from the top soil as it washes away.

I want to give you a few results that we have gotten from the things that seem to be essential for restoring and retaining fertility. I have in my hands the records of six years' work in a county which almost adjoins yours and which no doubt has some representatives here—Saline County. We applied limestone to the soil. We have turned back on certain parts of the field all of the farm manure we could make from the crops we raised. We have grown clover and turned it under, and I think you will be interested in knowing the actual records that we get.

Here, for example, is the wheat crop. As an average of the four years from 1911-1914 where we did nothing to the land excepting raise crops and harvest them, we got 7.6 bushels of wheat to the acre. Where manure was applied for one of the four years we harvested 7.9 bushels per acre. Where we added ground limestone at the beginning of this work in the fall of 1909, we got more clover to turn under, or more manure from the legumes and other crops to put back—instead of 7.9 bushels the four year average was 19.4 bushels. I want to repeat that the limestone did not produce all of that in the wheat yield; the limestone helped the corn as well as the wheat, it helped the clover very greatly, thus the limestone made it possible to produce more manure, and in consequence, more manure was applied in what we call accumulative system, a system of soil improvement that gets a little better every year, with land building up instead of decreasing in productive power.

Now you dairy people are more interested, I am sure, in corn for the production of ensilage and fodder and grain than you are in wheat, although I have no doubt some wheat is used in rotation for various reasons, but I am going to give you somewhat in detail our corn record.

In 1910 we had our first corn crop on that field. The untreated land produced 24.1 bushels of corn to the acre on one plot, 24.9 on the second, and 26.8 on the third. Those are three plots that had no treatment. They are nearly uniform—about 25 bushels to the acre—it was a good corn year. Where we put on ground limestone we got 40.1 bushels of corn; ground limestone and green manure, 42.8 bushels; and when we added phosphorus, 44.5 bushels.

The next year, 1911, we grew corn on a different field that we had different kinds of treatment on. The untreated land produced 28 bushels on one plot, 24.9 bushels on the second, and 17.8 on the third, thus showing variation, but we had an average of 25 bushels the same as before. Now we got our manure for the first treatment from the 1910 crops and instead of 25 bushels on untreated land, we got 41 bushels of corn on the manured land; manure and limestone produced 45.8 bushels of corn, and with the phosphorus added, 46.7 bushels of corn. Where we had the crop residues turned under, clover, straw, stalks, etc., and limestone applied, we got 36.8 bushels.

The next year, 1912, we had corn on still a different field and the first untreated plot produced 20.5 bushels of corn; with farm manure, 36.5 bushels; farm manure and limestone, 55.1 bushels, and when we added phosphorus, we got 58.9 bushels, no increase. We usually get a larger increase when we add phosphorus with clover and corn stalks than with manure. If we sell the grain, the wheat and corn from the farm and only return the residues, we don't get back as much phosphorus as we do with the manure. Another untreated plot in the middle of the field produced 20.4 bushels of corn; where we had turned under the crop residues the yield was 29.9; crop residues with limestone, 45.2 bushels, and where we added phosphorus with the limestone and residues, 55.1 bushels of corn. That is the third year and with corn on the third field.

1913.—The first untreated plot, 5.7 bushels; with manure, we get 12.9; manure and limestone, 17.2; manure, limestone and phosphorus, 17.1 bushels. The next plot yielded 4.5 bushels untreated; 9.4 with residues; 17.5 with residues and limestone;

and 17.9 bushels with residues, limestone and phosphorus. That was the first of two very dry years.

1914.—Not very different from 1913, the untreated plot yielded 7.6 bushels; manure, 13.2 bushels; manure and limestone, 16.3 bushels; manure, limestone and phosphorus, 14.1 bushels. The next plot untreated yielded 8.5 bushels; with residues, 10.7 bushels; with residues and limestone, 14.4; with residues, limestone and phosphorus, 16.4 bushels.

1915.—This is the sixth crop. Untreated land made 23.2 bushels; with manure, 36.5 bushels; manure and limestone, 59.3 bushels. The application of limestone made in 1909 was all that that land had received, but we applied six tons to the acre. Phosphorus gave no increase, the yield being only 55.9 bushels. I advise people, if possible, to put four tons to the acre, never use less than two tons. After that system is under way, after you have put on your four, five or six tons, then you can put on two tons occasionally every four or five years. If you start with four tons, put on two tons every four years, that will be enough, but, if possible, put on four tons to start with, and five or six will be still better.

The last year, 1915, in our residue season, we sow something into the corn to plow under, cowpeas. If you get just the right conditions for the cowpeas to make a good growth, they will invariably pull down the yield of corn some.

Another plot, untreated, yielded 23.2 bushels; residues, 25.4; limestone with the residues, 45.1 bushels; and with phosphorus added, only 45.3 bushels.

I have the result of the six corn crops: Untreated, 109 bushels in six years; with manure, 158 bushels; with manure and limestone, 234 bushels; almost two and a half times as much as we had from the land alone, and that was the largest yield of corn we have from the field.

I feel like emphasizing, as I have done for many years, that one should be in no particular hurry to apply the phosphorus to Southern Illinois soil. Use the limestone first and then grow plenty of legume crops, and build up the soil in organic matter with manure and crop residues.

I have these results reduced to money values for all the

crops that we have grown there, with corn 50c a bushel; wheat at \$1.00 a bushel; oats at 40c, and hay at \$10.00 a ton. Untreated as an average of five years since we began shows the average value of the crops from four acres to be \$22.11, and where we put on manure, limestone and phosphorus the four acres have given us \$50.47 as an average of five years. The land and labor you might say gave us \$22.11 from four acres as a five-year average. The manure gave \$5.97, the phosphorus, \$1.27, and the addition of limestone gave us \$21.12. What does that mean in the way of profit? We furnished the seed, plowed and prepared the land, did everything that was reasonable in farming, and we got a return from four acres of \$22.11. On another part of the field, when we started we added six tons of limestone that you can get delivered at the railroad station for not more than \$6.00. Where we did that, the limestone alone gave us \$21.12 compared with \$22.11 for the land and labor and the seed and all.

Now, Mr. President, I think I have taken all the time I should in giving these facts. If you have any questions, don't hesitate to interrupt me with them. I will give you some results this year from the Ewing experiment field, in Franklin County: Untreated, 25.5 bushels of corn; manure applied, 40.3 bushels; with manure and limestone (five tons per acre in 1909) the corn yield this year was 61.6 bushels per acre. Farmers in the corn belt figure the average, year after year, as 45 bushels. Phosphorus gave no increase on the corn there. It does not increase the corn crop the way it does wheat, and the wheat this year was reduced a great deal on account of the spring drouth in Southern Illinois.

Untreated land yielded 5.4 bushels of wheat; with manure, 8.2 bushels; with manure and limestone, 18.1 bushels, and with manure, limestone and phosphorus, 23.6 bushels.

Our oats on the Ewing field made 9.7 on untreated land; with manure (applied in 1914 for corn), 16.8 bushels; 37.4 with manure and limestone; and 49.4 with manure, limestone and phosphorus. Where we added limestone and residues, the oats made 43.9 bushels, and with phosphorus included, 44.5 bushels.

Southern Illinois is not alone in the need of soil improvement. The corn belt soil must also be improved or it too will go down and produce less.

In 1914, wheat on the south farm at the University of Illinois brought 18.4 bushels per acre with crop residues turned under; with manure, 18.7 bushels; with residues and phosphorus (raw rock phosphate) instead of 18.4 bushels, we got 32.2, and with limestone, residues and phosphorus, 38.1 bushels. I told you the manure made 18.7 bushels; manure and phosphate made 39.5, and manure, phosphate and limestone made 47.6 bushels.

In 1915, on a different field, residues produced 26.6 bushels of wheat per acre; residues and phosphorus, 45.7 bushels, manure, 31.8 bushels; manure and phosphorus, 49.8 bushels. This is the thirteenth year of this experiment.

Q. How much manure do you apply?

A. We apply all we can make out of the crops. The actual amount that we return is just as many tons of manure per acre as the tons of produce hauled off from four acres. We weigh the corn and corn stalks and add to that the weight of the oats and the oats straw and the weight of the clover or cowpeas, and of wheat and wheat straw, and whatever number of tons that is for 1915 for four acres, that weight of manure will go on an acre for corn in 1916.

We find in feeding experiments that any farmer who is reasonably careful in his feeding and in handling of manure, can produce as many tons of fresh farm manure as he hauls off tons of air-dry produce. I don't mean he can feed live stock and get everything back on the land. When air-dry produce is hauled off the field, about 25 per cent of it is water, and 75 per cent dry matter. The fresh manure as you haul it back on to the field contains only 25 per cent dry matter and 75 per cent water—animals take out a very considerable amount of it, they destroy about two-thirds of the organic matter of what they eat. If you weigh out a ton of dry feed and collect and dry all the excrements from that feed, how much do you suppose you would get? About 700 pounds, or one-third of the total weight of food consumed; but you get back about three-

fourths of the nitrogen and phosphorus, if you don't lose any. We can sell the wheat out of this rotation and lose about one-fifth of the manure production and still get back as many tons of fresh manure as we hauled off in air-dry produce.

Q. Will that amount of manure keep up the fertility of the soil?

A. If you have enough legume crops, it will keep up the nitrogen. I think it will do it in this rotation if you always insist in having the legume in rotation. I would prefer, where you can do so, to have five fields and put alfalfa on the fifth field, and for live stock farming you may have two crops of corn, the wheat crop being omitted. Leave alfalfa on one field for four or five years and then move it over and keep that combination going on. That system will maintain the nitrogen and vegetable matter. No rotation by itself will maintain soil fertility; you cannot maintain fertility by rotating crops any more than you can maintain your bank account by rotating your check book among the members of your family. Limestone must be applied where needed, and ultimately phosphorus must also be applied.

Q. What would you consider the manure value of a crop fed and turned under on an old pasture?

A. It is very difficult to know the value of decaying organic matter. You would get about three-fourths of the plant food in the crop returned to the pasture, but you will only get one-third of the vegetable matter or humus-making material. Some of your lands tend to wash badly. Under those conditions humus has a high value.

Q. Is it a good idea to haul manure on alfalfa land?

A. That is a good use to make of manure, but we ought to be able to make still better use of it. The element of chief value in the farm manure is nitrogen. Alfalfa gets its own nitrogen—it looks almost like a waste of nitrogen applying it to alfalfa. At the lowest commercial prices, 15 cents a pound for nitrogen, 12 cents for phosphorus in bonemeal, and 6 cents for potassium, manure would be worth \$1.50 for its nitrogen, because there are 10 pounds of nitrogen in a ton of manure, 24 cents for the 2 pounds of phosphorus, and 48 cents for

the 8 pounds potassium. You ought to be able to utilize the nitrogen to better advantage than feeding it to alfalfa.

You can maintain the soil fertility if you will put on the limestone and phosphorus and then turn under vegetable matter; whether in manure or clover. If you put alfalfa in the rotation you can sell alfalfa hay, if you are not live stock farmers. The grain farmer may also grow alfalfa, and most of your hill land here will, if you fix the soil for it; but to sow alfalfa without soil treatment is just like wasting about \$3.00 an acre for seed, because you will lose the seed. If you will put on four to six tons of limestone and turn in some legume crop, then you can start alfalfa with the proper inoculation. You probably cannot grow it successfully on the so-called hardpan prairie land, or on similar types of timber soil. I would not advise anybody to sow alfalfa unless the soil is properly prepared. You must have the limestone.

Q. What do you think—would it be any benefit to the land to turn under the third crop of Sudan grass?

A. It would not add any fertility to it. You cannot build up the land by growing Sudan grass; all the plant food it gets it gets from the soil. It does not add any fertility and it ought not to be used for that purpose.

O. Would it do to put limestone on growing wheat at this season of the year?

A. If you want to grow clover you can apply limestone any time before, or soon after the clover is seeded. It is not the ideal way, but is better than not at all.

I would like to make a suggestion to all of you: When you begin to use limestone that you save a strip across every field a rod or two in width as a check strip. You need that sometimes for your own knowledge, and the demonstration upon your own farm is worth leaving the limestone off that strip. It is not an experiment, but a demonstration. You may also get good returns by having the satisfaction of letting your



N. J. Nelson, Peoria, Peoria Creamery
Co., Peoria, Ill.



F. Kohl, Centralia, Ill., wholesale
grocer, who has taken a leading
part in Dairy Development in
Southern Illinois.



Prof. C. G. Hopkins, head of Agronomy
Department, University of Illinois.



E. K. Porter
Mayor of Carbondale, Ill.

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neighbors see it, those that come around and tell you you couldn't put any of that stuff on their land.

Q. When is the best time to turn under clover or cowpeas to get the best results?

A. For the enrichment of the soil, when they have made their full growth, but you must be governed by other conditions often. You know better than to turn under a full growth late in a dry spring.

Q. In your Ewing field, did you inoculate the soil?

A. We always inoculate for alfalfa and sweet clover, and where clover has not been grown for a number of years, I advise inoculation for clover just the same as alfalfa.

In conclusion let me remind you that the University of Illinois gets out certain publications giving much information, including, for example, the detailed results from the Raleigh field up to 1914. You write a postal card addressing same to the University of Illinois, Urbana, Illinois, and say, "Please send me information on soil improvement for Southern Illinois," and you will receive it and all it will cost you will be the one cent for the postal card. And you don't even have to say "please." One thing you must do, however, is put down your name and address. If you tell them to put your name on their mailing list, then you won't have to write any more. There is one circular on ground limestone, how to spread limestone, etc., a good deal of information. Some of you don't get the Experiment Station Bulletins because you are too lazy, not physically, but mentally. There are a lot of farmers who would rather get up at 4 o'clock in the morning and work until 9 at night than to write that postal card. (Laughter.)

FEED FOR THE DAIRY COWS.

Prof. J. A. McLean, The Quaker Oats Co., Boston, Mass.

I expect you think I am rather presumptuous in coming from the Far East to discuss this subject with you people. We, in the East have grown into the dairy business; it is an old industry with us and about the only kind of live stock you find in the East is dairy cattle.

I would like to extend to you congratulations, upon so large a meeting. I think the Dairymen's Association is to be congratulated; undoubtedly the reason you do have so good a meeting here is because you have many groups of men working together for the improvement of the dairy industry. Co-operation is the thing that is going to make your country—we are coming to it very fast. Your bankers always have been interested in agriculture, but they are more so today than they ever were before. Your merchants realize that they cannot run their stores with unsuccessful farmers all around them. In order to have successful business in the city we must have a successful country. Consequently, I think it splendid that our bankers and business men are coming out openly and doing what they can. They know when they are helping you they are helping themselves. It is a matter of co-operation entirely.

We have a lot of state institutions in the East. One in about every 250 inhabitants of the New England states are inside the institutions and going through one of those institutions one day we saw a small chap in one of the rooms watching over about fifty of these feeble-minded men who were nearly all as big as this man Johnson I met here today and we asked this little chap, "Are you in charge of all those big fellows?" "Yes." "Aren't you just a little afraid that they might get together and do you harm?" "No," he answered, "if these fellows could co-operate they would not be here."

The spirit of co-operation shown speaks much all along the lines of industry.

There is no system of farming that has yet been devised whereby we can continue to build up our farms, passing them on from father to son, from one generation to the next, better farms, more productive, that does not include live stock in the proposition. Further, there is no other type of live stock that will continue to give returns to the farm, that will bring in the money more regularly, that will continue to fit in and build up the farm, equal to the dairy cow. I have not time to go farther into that. I don't think any farmer will question that. We are farming for what? To feed the people of the United States and of the world, that is our job and that's why we farm. If the people did not have to be fed and clothed, you and I could get along without doing as much work. The dairy cow produces more food for men, more economically, and more profitably than any live stock, consequently you will find them all over the country. Lots of us can remember when all bovine live stock was beef cattle. I was born near the Atlantic Coast and I can remember when there was not a thing in that section of the country but beef stock and now there is nothing but dairy cows. Dairying has crowded the beef animal up to the Middle West, to the Rockies, and all the time the dairy cow is taking its place. The dairy industry is going to continue to grow, because our country is increasing in population our people must be fed and milch cows are best suited to do it.

There are three things in connection with the live stock industry, "The Three Graces," if you like to call them that, that we must tie to:

The BREEDING, WEEDING and FEEDING of our cattle.

If you have to go before I get through, take that idea with you. I cannot tell which is the greatest of these three, they are all equally great.

I shall discuss the feeding of the dairy herd and why it is important. In the first place, of the total bill in connection with the dairy herd, just about 50 per cent is represented in the feed. That being the case, it behooves us day by day to watch the

feed bucket. More than that, its control is actually within our own hands. Now there are other ways of improving the dairy industry, but the most important within our own hands is in the feeding. If we are feeding too much or not right, we can rearrange and show results at once.

One thing emphasized here in every talk was the importance of breeding. Professor Hulce emphasized the matter of breeding, some one else this morning from the standpoint of the producer. But I want to say this to you, that you can spend lots of your money, go out and buy good bulls, pay \$150 to \$250 or more for the best kind of sire and put him in your herd, and if you do not feed and develop the young stock you will still have a herd of pure bred scrubs.

Good cows have been put into this section and if you will feed them properly you will soon find them out. If you are going to realize on your breeding, get good sires and develop your herd; if you don't feed a calf and get the development when it is young then you never will get it. I wish I had time to elaborate on the subject.

Dropping down to the question of feeding itself, we have had interesting developments in the art and science. I can remember very distinctly when we fed our cows and the only thought was to get them full, let them fill themselves, it did not make much difference what we filled them up with. We fed them wheat or oat straw, and the more wheat straw a cow eats the thinner she gets. We grew from that into the feeding of hay, and then our Experiment Stations sprung up and have been leading us ever since. The trouble is, we don't attempt to follow them always. I would like to have every man that has been interested or has any interest in a farm either directly or indirectly, to see that his name is given to Doctor Hopkins before he gets away and get those bulletins; that is one of the great crimes, neglecting to get them. If you take what Doctor Hopkins gave you today and nothing else, and put it to work I am confident that you would make over this section of the state of Illinois. Don't let it slip from you, and don't let him get away without having your name and address—and your troubles.

The next step emphasized was the feeding of protein. There was a time in connection with our dairying, and we are just getting over it, when we thought it essential to feed the cow plenty of protein, but there is an additional step and that is to feed the cow the thing she wants, the thing she needs, in the form in which she can handle it and wants it.

Protein is an absolute essential to all types of animals and particularly to our dairy cow. An animal will not live unless it receives its supply of protein, and a cow cannot make milk unless she receives protein out of which to make the milk. Protein is necessary for the purposes of life, to keep up the activities of all the cells of the body, but here is an interesting thing in regard to it and with that I shall dismiss it: the cow cannot use more than so much protein, and if you feed her more than she can use, she cannot store nitrogen in the body so it is excreted. It being your highest priced article of food, it is bad practice to overfeed on it. In addition to that it is a stimulant to all the cells of the body. We have found this everywhere in the country, that when a man overfeeds with cottonseed meal he has trouble with the udders of his cows. What is the reason? When he is feeding three or four pounds of protein a day, it is more than the cow can use, it is a high stimulant and it overworks the active cells of the body,—and the udder is nothing else than a mass of active cells.

I have a friend in Massachusetts who makes one of the highest grades of milk going into the Boston market. He has over a hundred Jersey cows. He was having trouble; ten per cent of his cows were giving pussy milk. He had been feeding them alfalfa hay, ensilage and a high protein feed. I said, "In my opinion you are feeding them too much protein and you are overworking those cells to the point of breaking them down, and my recommendation would be to make the ration 50% of carbohydrate material." In three weeks the entire group of cows had cleaned up and were free of pussy milk.

While one swallow does not prove the spring nevertheless there are many such cases to show that the overfeeding of protein is often the cause of trouble with the udders of cows; there is

great danger of damaging your cows with heavy feeding of protein.

Passing on to the starches of carbohydrates we find them the chief source of energy and of fuel supply to the cows, or any type of stock. One thing about the starches, while you may overfeed, the cow will store the surplus in her body, if it makes fat on the cow's back when she is dry it will come back to you in part or all when she is fresh.

In that connection, just one thing more. It has been established by your University, that of Missouri, Minnesota and a number of others, that a 1,000 pound cow giving thirty pounds of average milk, requires about 2.26 pounds of digestible protein and she requires about 15 pounds of carbohydrate equivalent. I want to give you that proportion: about one to 6.8—one protein to $6\frac{1}{2}$ of carbohydrates in the ration. We have got to supply her those things in that proportion.

There are other factors when we come to make up a ration for a cow. It has to be bulky; it has to be succulent; succulent feeds consist largely of water. I would hate to make milk without ensilage, if I had ten or more cows. The next best thing is a root crop. Ensilage is the thing. The ration must be palatable; we lose sight of that often, we think there is a nice bunch of feed and push it up to the cow and wonder why she does not eat it—she does not like it, it does not appeal to her. On the other hand when fed palatable food you will find cows will eat more, and will digest it better. And you want a cow to eat and to eat much. Eating is a habit, it is so with men and it is so with cows. If cows do not get palatable food they will not eat so much and will not digest so much. Besides being palatable it has to be varied. The cow is like men and women; we like to have a different breakfast tomorrow than we had this morning—we want each meal different from the last. The dairy cow is just as particular as we are, but she wants it in a different way. She wants a number of different things mixed up to make her ration. Feed that mixture three times a day and seldom change so long as she does well on it, and when you make a change, do it gradually.

Grow alfalfa and clover. We grow alfalfa in New Eng-

land and we think we have about the hardest proposition for farming of any part of the country, yet we have got one county in Vermont growing 800 acres of alfalfa. Now, if that can be done there, and we are doing it, you can do it here. I believe in alfalfa and so thoroughly that I would work with it. We talk so much about alfalfa that we scare you from trying it but it is not a hard proposition. Try it, work with it, you will soon get the right kind. You can grow clover if you will drain and lime your land. The dairy cow has got to have those things if you are going to get milk. Those are our best sources of protein. You have also cow-peas and leguminous crops with which I am not quite so familiar. If you cannot get protein that way, you have to go to the market supply in the form of cottonseed meal and other meals.

Then coming to carbohydrates, I will say the same thing to you: grow them on the farm in the form of corn, barley, oats—no better food for man or beast. You have in addition to that the carbohydrates in your hays. I would not attempt to enumerate them all, Timothy hay, Red top Mixed grass hay; Herd's grass is a nice hay to make, nice to farm with. But we are apt to let it stand until it is too ripe. We grow Timothy hay, feed it to the cow, and charge it to the cow at \$25 a ton and then wonder why they do not make you a profit in our dairy, and we might just as well offer her wheat straw. Timothy hay is not a feed with which to make milk. While your mixed grass hays appear to be good feeds from analysis, and while you do add carbohydrates in corn stalks, don't expect your cow to give much milk on Timothy hay and corn stalks. Play square with the cow. Give her a chance. Grow clover and alfalfa, that is the only way to do, and supply carbohydrates in a palatable, varied digestible form.

Of course, in addition to that we have this thing to face all the time, viz.: that your carbohydrates—corn, wheat, oats, barley, are more and more in demand to feed the human family and consequently you must more and more draw upon the by-products of the cereal industry for stock feeding.

Make as a basis of your ration, clover, alfalfa and silage. Always bear in mind palatability, variety and balance.

Remember this, the cow that will make you money in your dairy, the cow that is the profitable cow for you to keep, the only kind to keep,—and I would not recommend any dairy cow to you if she is not a profitable proposition—the cow for you to keep on your farm is the cow that has the capacity to eat a lot of feed. Now think that over. You fellows who let your cows hustle for themselves, give them no grain at all, or very little, remember—she has to have food stuffs to make milk. The reason that the cow that takes a lot of food is your friend and makes you money is this: whether or not that cow is giving any milk at all, you have to keep her alive, to get milk from her later on. We call that the maintenance requirement; and when she freshens she still has to have food to keep up her body, furthermore, what you give her beyond that amount is what makes your milk; so much for maintenance; food beyond that amount makes milk and this little bit beyond the maintenance has got to foot the whole bill. Suppose it takes 7 pounds, as an illustration, of grain to maintain that cow, when she's dry, and when she's milking you give her 8 pounds, that additional one pound has got to settle the whole bill. The cow that has a lot to eat returns you a profit. I am not fabricating, that is a fact. Always where you put brains in the ration, where you have a cow with capacity for giving milk, a cow with a dairy temperament, this is true; don't lose sight of that.

We lose money by underfeeding our good cows.

Let me say this, and I have not been over your section of country at all,—I believe there are good cows in this town that nobody has ever discovered. I believe there are some good cows around here, but how are you going to find it out? Give them a chance, feed them, find them. The necessity of feeding, is very evident from what Professor Hulce gave us here, and I am sure that I am right.

I recall an instance given at one of our Pure Breed meetings. "Remember this: some of the world record cows are in your hands and nobody is finding it out. You are not feeding and giving them a chance. I remember with a great deal of regret the time I sold the mother of King Sigis for \$60, I doubt if there ever was a better cow." We lose money by underfeed-

ing our good cows; we also lose money by overfeeding our scrubs, if we are feeding at all. So the last thing I will say on this question of feed is to feed in proportion to the milking capacity of your cow. Give the good cow her due and give the poor cow to the butcher.



TUESDAY, 8:00 P. M.

**MUSIC :—Complimentary Concert by the Southern Illinois
State Normal University Orchestra.**

PROGRAM

Prelude.

- | | | |
|----|---|--------------|
| | “Father Rhine” | Lincke |
| 1. | “Zampa” Overture | Herold |
| 2. | “Shadowland” | Gilbert |
| 3. | “Blue Paradise” Selection | Romberg |
| 4. | Vocal Solo | (Selected) |
| | Wm. L. Hays | |
| 5. | Oriental March | Bendix |
| 6. | Waltz from the Ballet “Dornroeschen” | Tschaikowsky |

Finale

“Stars and Stripes Forever”	Sousa
Intermission	

Address	W. W. Marple, Chicago
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Address—Interest of the Town Merchant in Dairy Farming	J. D. Jarvis
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RELATION BETWEEN THE TOWN MERCHANT AND THE FARMER IN UP-TO-DATE BUSINESS BUILDING.

By J. D. Jarvis, Dairy Development Dept., The DeLaval Separator
Company.

We are living in a new era, a new age, and new business problems are constantly before us. The business methods of the merchant of a few years ago are not the business methods of the merchant of today. There is a constant evolution in all things, plants, animals, human beings and business methods. This evolution is advancement. We are not turning back but we are gradually progressing. We, as Americans, believe in progress, believe in education, believe in building up and not tearing down, believe in the spirit of providence and believe in helping our fellow men. In fact the spirit of co-operation or interdependence among all classes in business is the live issue of today.

Has the thought ever occurred to you, Gentlemen, that if the merchant helps his customers to progress, he likewise will progress? His customer is the farmer, he is the greatest producer of any class in business; likewise he is the greatest purchaser. When he is successful then all are successful. When he earns more money, he will spend more money.

Since many farmers in this country did not have an opportunity to acquire a good basic knowledge of the science of agriculture when they were young men, and hence are not as proficient as they should be, many manufacturing enterprises, boards of trade and banking associations are devoting time, effort and expense to the betterment of agricultural methods. There is an economic reason why the farmers should be given this attention; according to James J. Hill, the great railroad builder of the Northwest, "Forty years ago a farmer had to provide for but one other than himself. Today every farmer must

provide food for two besides himself." It is good policy for commercial enterprises to assist their customers to a greater earning power, to assist them to earn two dollars where they now earn but one, so they may spend a proportionate part of the extra dollar for a better education of their children, more comforts for their homes, to purchase better farm implements and equipment and to enjoy the beautiful in life.

The recent report of the Department of Agriculture for 1915 shows an enormous amount of wealth, over ten billions of dollars from the farms of this country and of that wealth, Dairy Products are second only to the corn crop. Dairy Products: Milk, butter, cheese, condensed milk, ice cream, milk powder, milk sugar, and casein products to nearly a billion dollars gave a greater income to the people of this nation than the combined total crops of Irish potatoes, sweet potatoes, tobacco, barley, sugar beets, sugar cane, rye, rice and wool. Dairy products are greater in value than the wheat crop, hay crop or the cotton crop and yet many farmers and business men consider dairying as woman's work. Men as a rule prefer physical labor, plowing, planting, harvesting and threshing of grain crops, or feeding large herds of steers or hogs. They want to receive their money in large sums and get-rich-quick. They forget that it is the small things that count, "That if you take care of the pennies, the dollars will take care of themselves."

Dairying is a cash business and as a cash business it tends to remove the evil of credit. The grain man, the feeder of cattle, and the fruit man each receives his money in lump sums once or twice a year. He may get a crop and then again he may not. This is not the case with the intelligent Dairy Farmer. He gets his crop morning and night, and this crop can be turned into cash daily. These small daily returns in the course of a year amount to considerable cash. He who receives his money in small amounts and at regular intervals becomes thrifty and pays as he goes, and does not run up unnecessary accounts. This is one of the first requisites of prosperity; hence, dairying brings prosperity. Prosperity results in business building; therefore, Dairying is a business builder.

For proof that Dairying is a business builder, I have but to refer you to the wonderful growth of business in Wisconsin caused by the development of dairying in that state in the past twenty years. The value of dairying to that state is estimated at an annual income of \$100,000,000.00. This large amount of money, which represents the accumulation of small daily cash incomes, has been the means of good business in that state because it is the cash in circulation in any community that gives that community a good financial rating. Even after the outbreak of the European War in August, 1914, the daily cash returns from the dairy cows enabled the farmers, merchants and bankers of the dairy sections of Wisconsin, Minnesota, Iowa and Illinois to enjoy a good prosperous business. Take a creamery making over 150,000 pounds of butter annually—last year, 1915, the average for butter Chicago market quotations was over 28.4 cents, or in the above case over \$42,600. With successful creameries or cheese factories in a community you will also have the developing of dairy cattle centers because the farmers will appreciate the value of better dairy cows. Take districts like Waukesha or Lake Mills, Wisconsin, Northfield, Minnesota, or Elgin, Illinois; they are known throughout the United States and Canada as dairy cattle centers and buyers for good dairy cattle from all over the United States, Canada and even from Japan and Australia come to these districts to make purchases, thereby bringing prosperity to these districts.

Dairying is constructive agriculture. It enriches the soil while grain farming or cattle ranching depletes the fertility of the soil. These latter types of farming are often called soil mining. When the farmer sells 100 bushels of corn he also sells \$15.00 worth of his fertility and when he sells 100 bushels of wheat he sells \$20.00 worth of his fertility, but when he sells 2,000 pounds of butter, he sells only fifty cents worth of fertility. In other words, when he sells \$22,700 worth of butter, he removes only as much fertility from the soil as there is in 100 bushels of wheat.

Dairying solves the farm labor problem because it gives steady employment the entire year. At present there are large numbers of unemployed men in the cities. These men ought to be

employed on the farms of America and probably would be, if farm work was more stable. Generally men are employed during the summer season and then discharged in the fall because there is not enough labor on the farm to give them employment during the winter. Short time positions attract only the lowest grade of help. By making dairying the important branch of farming, winter dairying will be carried on, cows will be fresh in the fall and milked throughout the winter. They will return at this time of the year greater profits because a higher market price for butter fat and a greater percentage of cheap foods like ensilage and hays will be consumed. Winter dairying will help distribute the farm labor throughout the year and men and their families will be employed by the year and be able to save money and better themselves as well as return a profit to their employers.

Dairying will improve the educational, social and moral conditions of the country. The tenants will be able to pay the rent and will not be forced to move from one farm to another as is the condition today. The one-year tenant means destruction to the farm. He does not keep the buildings in repair or return the fertility to the soil. He tries to skim all the profits from the farm, and the landlord tries to make him pay a large cash rent in return. If dairying is carried on, silos and better farm buildings will be built to take care of the crops raised, more live stock will be kept per acre, and there will be a more intensified farming. There will be that inter-dependence between the tenant and land owner from which both are benefited. There will be better rural schools, better churches and the educational, social and moral conditions of the community will be improved.

If you compare the dairy sections of this country with the non-dairy sections, you will see at once that the dairy farmer has a well kept farm, fences in good condition, lawn mowed about the house, flowers and shrubs decorating the lawn, barns economically and substantially built. Inside the home you find everything comfortable, homelike, a library, agricultural papers, magazines, and you are impressed with the thought that the

farmer and his family are contented and happy. The picture is somewhat different than that of most of the non-dairy farmers. They have fences that need repair, lawns unmowed and unkept, barns that are not desirable to house stock because of poor ventilation or sometimes too much. Inside the home you do not find a library, agricultural papers or magazines. Some of these homes appear like camping places and give one the impression that the owners do not intend staying there very long. The children are generally attracted by the white lights of the city and because of these existing conditions leave the farm. The Department of Agriculture at Washington, the State Experiment Stations and the Agricultural Colleges are giving to the people of this nation information relating to the economical production of food stuffs. You are supporting these institutions through your taxes, directly and indirectly. These institutions are doing noble work, but you can assist them in accomplishing their purpose by becoming more interested in the business of the farmer in your community.

According to the last census report, Illinois has over 1,000,000 dairy cows. An increase of 50 pounds of butter fat per year per cow, will give the state over \$14,000,000.00, or approximately \$140,000.00 per county. This large sum of money which represents a cash business, will increase the farmers' purchasing power and thus develop business in the entire community.

Since the average farmer cannot pay the high price for good pure bred dairy cows, he must use his grade cows and improve their offspring by the use of good pure bred dairy sire. High class pure bred sires are not cheap in price, but you can help your neighbors to co-operate and buy several pure bred dairy sires for their joint use. One bull can be used to fifty cows. The districts can be numbered and the bulls can likewise be numbered, 1, 2, 3, 4, 5, as the case may be. After bull No. 1 is used two years in one section, he can be transferred to section No. 2; bull No. 2 to section No. 3; bull No. 3 to section No. 4, and so forth. These bulls must not be closely related to each other, because we want to prevent inbreeding. With the

aid of the Babcock butter fat test and a spring balance to weigh the milk, the farmer can learn which cows are the profitable ones. By disposing of the unprofitable cows, he can increase the profits of his herd. From experimental data where a pure bred dairy sire was used on a grade herd, the heifers produced 50 pounds more butter per year than their dams.

It may seem almost impossible for each member here to use this advice in his local community. The question that presents itself to you, "How can this be accomplished?" In almost every city and town in the United States, the business men, bankers, merchants and even clergymen, belong to the Commercial Club. The duty of this club is to promote business in their city or town. They are willing to give a bonus to a manufacturing plant to come to their city. Why? Because this establishment will employ a number of men and women. More men and their families in the city means more business to the members of this Club. The policy is all right and should be encouraged but this same Commercial Club overlooks the fact that adjoining the city are hundreds of manufacturing plants that are inefficient and are not turning out the quantity and quality of products they should and hence are not adding to the community as much wealth as they might. These plants are the farms and the machines are the dairy cows that will take the feed produced on these farms and manufacture it into milk. These farms can be brought up to a greater efficiency by your Commercial Club becoming active in this work and establishing a department of dairy improvement. This department should give advice relating to dairying, bring the farmers together at picnics, judge dairy cattle and dairying products and help the farmers in improving their stock by co-operative community breeding. The butter fat records and breeding records can be kept by an assistant to the Secretary of the Commercial Club. The farmers that are in this co-operative breeding association can pay their dues to him and the Commercial Club will be more efficient to advance business in their local community.

At Centralia, Illinois, the Commercial Club has taken in the



W. W. Marple, Chicago, President Illinois Butter Manufacturers'
'Improvement Ass'n, with Fox River Butter Co.

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farmers as business men and they have started a Co-operative Guernsey and Jersey Breeders Association. This body of men are also "Boosting" the local creamery and the Merchants State Bank is helping the farmers to purchase pure bred sires and high grade dairy cows to improve their dairy herds. Another example of business building is at Trenton, Mo. The business men of this little city, and the business men of the surrounding country, have rejuvenated their Commercial Club. They call their plan the "Trenton Idea" and say, "It simply means that in this 20th Century of commercial supremacy and agricultural efficiency, the farmer and the business man must unite and co-operate in the fullest sense of the term." They have stimulated business in the local community, better roads are the direct result and the farmers and merchants have a better understanding of one another. Today many business building schemes are successfully assisting the farmers and town merchants to cope with mail order house competition.

Through organized effort you will be more able to assist the farmers to select, breed and feed their dairy cows, build silos and better barns, grow greater crops and obtain a greater yield of butter fat per cow. You should help them to obtain the best price possible for their cream. This can be best accomplished with benefit to both the farmer and the community. This immediate assistance to the farmer would give them a greater income and eventually build up business. This is possible and each member here should try and interest his Commercial Club to promote Dairying and be doubly active in promoting a higher standard in Dairying.

Finally, if the farmer earns little, he spends little. If he earns much, he spends more, because he has more to spend. The farmer is the chief source of income in any rural community. As he is aided in a greater building of his business, the greater advancement and upbuilding of the business of the whole community inevitably follows. This is the broad foundation for up-to-date business building.

WEDNESDAY 10:30 P. M.

Meeting held at the Southern Illinois State Normal University in the auditorium, with an audience of 1,000 young people, students at the University and of the City High School.

Doctor C. E. Allen presiding.

PROGRAM.

Music—University Orchestra.

Song: "All Hail the Power of Jesus' Name!"—by students.

Lord's Prayer.

Music—Two selections by Orchestra.

Doctor Allen: "The school is highly honored this morning in having with us representatives of the Illinois State Dairymen's Association, and I want to assure these gentlemen that we are very glad to have you here. We consider it a great compliment to the institution, that you have seen fit to hold your session this morning here with us.

I think I may say something that the president of the association would not like to say, and I am going to say it now: We realize that we are behind in the matter of dairying in this section of the state. We admit that we have not accomplished in this line as other sections have. Now, if Mr. Mason feels as I do, he would not like to say that to us, but I think it is a good sign to admit it for when a man knows that he knows not, there is some hope that he can be taught. I think the efforts of Mr. Matthews, our Pure Food Commissioner to have this Convention held here and to further the dairy interests, is commendable, he fully understands the needs.

We do not admit that we are behind the state in all respects, only in this one. Furthermore, we hope we are not going to be behind the state in this respect very long, and we feel

that we have great opportunities for dairying in Southern Illinois and we are going to try to improve them—we are looking upon you as missionaries.

We understand the Association meeting has never been held as far south as this city, and we are glad to welcome you here to the institution, and I propose now to turn over this session to Mr. Mason of Elgin, president of this association, and I am glad to introduce him to the school and to ask him to take charge of this session and do with these other men as he sees fit." (Applause.)

Mr. Mason:—Mr. Chairman, Ladies and Gentlemen: It is a little out of my sphere to talk to students, when I talk to farmers I feel right at home, but this is a little out of my line. I see lots of young men—let every boy that ever milked a cow raise his hand; I want to know if you have got any dairymen here. (Applause.) Now I want every girl who lives on a farm to raise her hand. (Applause.)

Now we will talk about dairying a little here. The vocation of agriculture is the greatest one there is. We don't realize it until we come to farm this high-priced land. The time is past when you can go at it and farm it haphazard. Scientific agriculture means putting into practice farming this high-priced land profitably, and the farmer does not realize the importance of his calling. His vocation creates new wealth; he creates more wealth and prosperity to our nation than any and all other lines of activities. Bear in mind that there is no vocation, no business, where there is so much money invested as there is in these farms, twenty, forty, fifty millions of dollars, where it is run as haphazard as farming is. It won't stand the abuse; you cannot put that much money into any other line of business, keep no track of things, not know where the money comes and goes, and hold together equal to that. On the other hand you put that right down to a good business basis, just as a bank or business man does with his business, and there is not a better business than farming. That is the one thing where the farmer lacks more than any other, and that is to learn to finance his business. That is the keynote of the situation. That will put

a farmer or any man on his feet quicker than any one thing he can do, it will also put confidence in himself and in his business.

In this dairy business, we are different from what you are in the grain section. While you raise your grain and don't put anything back on your soil, you are virtually selling that farm off by the wagonload, getting less and less each year. You have to take the market price for your produce, while you take it on a dairy farm you have two strings to pull on. You take a dairy farm is a manufacturing plant, the farm and buildings are the fixed capital, the dairy and tools the working capital, the object is to make the working capital pay a dividend on the fixed capital or the money invested besides adding to it in the shape of soil fertility. The harder you run that farm, the better you farm it, working your soil, growing good crops, and the larger the size of the crops you grow the more live stock you keep, the more fertility you have going back on that farm. You can take the average farm with careful farming and double its capacity in a few years. You are building up the farm on the one side, and dairy and live stock on the other. You can increase the production of the average herd on a ratio of one to four, or four times what it did on the average farm.

A good many of you think that this dairy business is a drudgery. You have got to get this business above drudgery. You take a good farm and the growing of good crops and the feeding of it to well bred animals and see them thriving and developing, there is not a vocation on earth with greater advantages and with greater possibilities. We want to show these young men that there is no vocation with greater possibilities than agriculture. We hear them say that you cannot pay for farms these days and there is no show for a young man. There is no better time for the young men than now. There is always a way for the young man, for the right young man, the opportunity is there if you can fill the bill.

When you run a dairy farm, you have got to have good cows, they have got to have good care and good feed, the right kind of feed and the right kind of buildings, those four go to-

gether and if you start in with a poor cow you will be disappointed, you have got to have a good cow. It is just about as much in the man as the cow, the average cow will give good results with a good dairyman, while a comparatively good cow may fail because of a poor dairyman.

All the time you are running a dairy farm you are building up your soil, and you take the silo, and your alfalfa, and a good cow and you have got a combination that is hard to beat, there isn't any line of farming equal to that, but you have got to have the right kind. You take the silo, you extend nearly the equivalent of June pasture throughout the year and that is the most economical way of handling the corn crop, is through the silo. On these high-priced lands the pasture is the dearest feed you have got. You can grow more crops on a field than you will get on the average pasture and your cattle will do better. Where you have the silo and the animal has her full feed three times a day, where she eats plenty and drinks plenty and lies down in comfort is what produces, and that is how to farm on high-priced land.

We want to encourage these young men to stick to farming, learn how to farm and keep at it, and above all things he wants to build up a character—that is the greatest asset a man can have in the world, it ought to be as good as his bond. He has got the advantage of us men who started years ago, knows how to feed the balanced ration for his cows and for his soil and get a large crop yield, and I want to speak about these county men we have. Last winter I was up in an institution in Warren County and they were talking about getting a soil expert and they wanted me to speak of it and an old, gray-headed man sat on the front seat and he said: "Do you think after a man has farmed for forty years anybody can tell him anything about growing corn?" There is no man so far gone as the man who thinks he knows it all.

ADDRESS OF W. W. MARPLE, CHICAGO, AT SOUTHERN ILLINOIS NORMAL UNIVERSITY.

Mr. President, Ladies and Gentlemen:—

When Mr. Caven advised me that I was expected to talk last evening and this morning and this evening, I felt like the prisoner upon whom sentence had been pronounced by the judge, and the judge asked him if he had anything to say and the prisoner responded: "Nothing, except I think you are mighty liberal with another man's time."

I was told before I came in here that all the students at this University were not interested directly in Agriculture and I am in the same class as the president of this association, Mr. Mason, who just talked to you. That part of my life that has been devoted to any interests in any branch of agriculture, has been on the side of dairying, so I want to say primarily that I am in the position of the new policeman that was appointed in the city of Boston and he only had been on the force a few days when he found a dead horse on Kosciuska street and he went to headquarters and reported to the sergeant that he had found a dead horse. "Where?" queried the sergeant. "On Kosciuska street," responded Mike. "Make out your report in the regular form," said the sergeant. Mike sat down at a desk and commenced and when he got to the name of the street, he asked the sergeant how to spell Kosciuska and the sergeant said: "You are making out that report," so he tried again. Then again he asked the sergeant who replied: "Don't bother me, I am busy, you are making out that report." Whereupon Mike picked up his hat and went out. "Where are you going?" asked the sergeant. "I'm going to move that horse on to Myrtle Avenue," was the reply. So I want to say to you this morning that what little time I take in talking to you I will move those of you who are not interested directly in Agriculture on to Myrtle Avenue.

I notice on the program and that has been emphasized once or twice by the secretary, that these are short talks. I would regret very much in connection with the gentlemen who are to follow me, to put this audience into the condition that the congregation of the old colored preacher was put in relative

to the Prophets of the First and Second Magnitude, and after he talked about two hours on the Prophets of the First Magnitude he said: "Now, we will take up the Prophets of the Second Magnitude. What shall we do with the Prophet Isaiah?" when an old colored fellow got up and said: "He can have my seat I'm going out."

I apprehend that there are those here that belong to this Association that have some idea of what I will talk about, and I confess to you that if my wife had not had company she would have written a speech for me to make at this morning's exercises but she told me what to say and as near as I can I will repeat it.

At St. Joseph, Missouri, two lovers were strolling, and after walking around for some time they sat down on one of the park benches. The young man was exceedingly bashful as most young men are, and he sat there silently for some time and could not think of anything to say, and the situation became exceedingly embarrassing to him and finally he turned to his sweetheart and said: "I bet you can't tell what I'm thinking about." "I bet I can, and if you try it I'll slap your face."

I am disposed to believe that this section of Illinois is not in a class by itself so far as negligence of duty is concerned on the part of those engaged in agriculture having neglected the dairy business but I do want to say to them and to the ladies and gentlemen before me, I want to say to you that one of your privileges when you go out into the world is to wield an influence for the betterment of this wonderful business or in any vocation that you may pursue. I want to say to those living in this section of the country that as the girl whose grandmother was visiting her said to her when she asked her the first time she had seen her, "so you are my grandmother?" "Yes, on your father's side." "You won't be here long before you find out that you are on the wrong side." So I want to say that the farmers in this section of the country who are only raising wheat and corn, you are on the wrong side, and if you continue you will find yourself in the same condition as the boy who was taught by his mother not to fight and he had pugilistic tendencies, and she told him to count to 100 when he felt like fighting and had an opportunity and by that time he would get

over it. One day he reached home with his face all bleeding and his clothes torn and his mother said: "My dear boy what is the matter with you?" "That's what happened to me while I was counting 100." So something has happened to you while you have been counting 100.

The foundation of this business in which these gentlemen are spending their lives is the dairy cow and before I go farther I want to pay this tribute to the cow. I feel like Governor Hoard who says when he meets a cow he feels like taking off his hat and saying: "Good morning, madam." She is a wonderful animal. In India she is worshipped. She is regarded as the steps to Heaven, a part of Heaven. I doubt if we realize the importance that she plays in the life of this country and each one of us. In the morning when we arise the first thing we behold is the wall on which the plaster is held by her hair. We put on a pair of shoes made out of her skin. We button our clothes with buttons, and comb our hair with a comb made from her horns. We go to a tempting breakfast and find she has provided us with a plate of butter, a piece of cheese, a glass of milk, a pitcher of cream, a smoking hot beefsteak, and above everything else are the sweet prattling children whose foster-mother she is.

We go to our places of business and fasten our important documents together with glue made from her hoofs. We go to our noon-day meal and have soup made from her tail. Delicious roast beef, pumpkin pie that is sweetened with sugar whitened with her blood, made out of pumpkins grown on land fertilized with her bones; and I am told we often eat this with teeth that through a chemical process have been made from her paunch.

She started her mission at Plymouth Rock, and tied behind the old immigrant wagon, she followed man to the setting sun. It was her sons who drew the wagon that brought to this country the early settler, and that turned the first sod. On her journey as the family camped, and when they finally settled, she picked up the straws that blew her way, and converted them into milk that filled the mother's breast that nursed the child

that became a ruler. She is the only animal that works day and night. It was she who stood at the hospital door and furnished the elixir of life that restored the emaciated victim of disease who was hovering on the brink of the River Styx.

I want to say just a word, especially to the young ladies that are before me as to the importance of the mission that they have. I attended a meeting of the Women Housewives' League in Chicago where various matters were up for discussion and among them came up this butter proposition, how it was made, and what they wanted to know how it can be improved on, how they can tell the difference between good and bad butter and oleomargarine, and do you know that there is an enemy in the camp? The brother of this cow is making strides towards competing with her, and in that meeting when they talked about legislation in favor of certain things in connection with the dairy business the president said: "It is not necessary, public demand will regulate that," that what they demanded they would get, and as I grow older, notwithstanding I have had 30 years' experience of where a woman is boss, as I grow older I note more and more the wonderful influence and the important part played by the women of our country and I am reminded of the committee that visited the governor about breakfast time and the dorky in charge of the door went up to the governor's room and said: "There is a committee downstairs that wants to see you." "Tell them I'll be down in a minute," was the governor's reply. His wife turned to Sam and said "Tell them the governor will be down as soon as he has finished his breakfast." Whereupon the governor said: "Sam, you know who is governor?" and Sam said: "Yes, I will tell them you will be down after breakfast." And I want to say that you have a wonderful influence and I beg you to exert it in the right direction.

I am thinking of a dream a bride had. She told it to her husband in the morning at breakfast and she says: "I dreamed last night that I was out shopping and I passed a place where there was a big sign that said "Husbands for sale" so I thought I'd go in and look them over and see what they were like. I found them all prices and all sizes, some as low as \$2.00 and

\$5.00, \$10.00 and up as high as \$2,000," and he listened with intense interest. He felt satisfied that she found his match in the \$2,000 class. "Did you see any there like me?" "Yes, and they were tied up in bunches at 10c a dozen." So I want to say to you young ladies that the future agriculturist that neglects to have a herd of dairy cows on his farm will be like those husbands a dozen in a bunch for 10c. So use your influence in the interest of this wonderful animal, for it is the foundation for a better home, and a better country, and during this terrible warfare in Europe those countries engaged more particularly in dairying are the countries at peace with themselves and the world, and the animal that they are interested in is a peace-loving animal and she won't do business on any other basis, harmony must prevail or she absolutely refuses to give results, and the association of these people with the dairy cow has made them a better people, a more prosperous people, has given them better home, happier homes, more contented people, there is not anything else that they want, consequently they will always be at peace as long as it is possible for them to be.

Now I think that I have but one more thing to say with reference to congratulating you for today of all the pictures that hang on memory's wall is the picture of a little farm home in Missouri and in that connection I see the old school house and I compare it with this one. A young man went into his father's blacksmith shop and the first thing he did was to make the link of a chain and his father said to him: "Make that link so strong that it will resist the test of time forever." So I will say as each of you form a link in a great chain, as you go out into the world let your influence be the link in the chain that while others may break, yours will stand the test of time. I thank you. (Applause.)

**ADDRESS OF PROFESSOR MORTENSEN OF AMES,
IOWA, AT SESSION HELD AT NORMAL UNIVERSITY,
CARBONDALE, ILL., JANUARY 29TH, 1916.**

Ladies and Gentlemen: When I came here this morning I was brought back about twenty-four years in my memory. About that time I left a similar institution back in the little country of Denmark, and I am always pleased to meet the teachers, or the coming teachers of Illinois.

You all enjoy your associations with the men and women here. You think perhaps that your teachers are rather strict at times, and they were so years ago the same as they are to-day. We had to go to school forty-six weeks of the year, six days a week, and at the close of the year we had an examination, and at the close of three years we have a final examination where we have to meet for examination in all subjects studied. So you will understand that teachers are really not getting more severe than they were in the olden days.

As you are teachers, or intending to be, you may be interested in knowing something about Denmark. In area it is only about one-fifth the size of the State of Illinois. In the year 1880 that country was practically bankrupt. It was shortly after the close of the war in '64 with Germany and Austria, in closing the war the Germans took the most productive part of the country. It was then up to the Danes to make a poor living.

In 1880 in the country schools in that country, our lunch, which we brought with us, usually consisted of dry, rye bread, butter enough so that we could see it through a magnifying glass and on top skim milk cheese—that was our lunch and we were pleased to have it. You will readily understand that they had no amount of wealth in that country. They were at that time producing beef which was sold in the English market, and they sold it at the highest current prices, but as they were losing about \$1.00 on each animal they prepared for the market it was not possible for them to get ahead financially. The Danish

Experiment Station began to look into the matter of dairying, but the cows that they had were only producing 120 pounds of butterfat a year, consequently it was not possible to produce butter at a profit, then they began to improve these animals until today they are producing 240 pounds of butterfat a year. Out of herds numbering 81,000 cows they have an average annual production in one district of 278 pounds of butter fat per cow.

Let us now follow this little country up to the present time. For the past twenty years that country has imported grain and corn from this country, so you are widely interested in Denmark for that reason. A good deal of the corn produced in Illinois is shipped across and sold to Denmark and they are producing butter from your Illinois corn. You will probably be interested in knowing that in 1913 Denmark imported corn largely from the United States to the amount of fifty-one and a half million dollars. Do you realize that the value of the Illinois corn crop the same year was one hundred seventy-eight million dollars? Denmark is only one-fifth the size of Illinois but it will annually import more corn than is grown on one-fifth of Illinois' soil. Statistics furthermore show that the fertility of the Danish soil has gradually increased during the past twenty years and showed in the year 1913 a gain of 53.2 per cent above what it was twenty years ago.

When you come back, as I notice you gradually do, to milking cows you want to ask your father if the same is true in reference to his farm. Has that land increased in fertility 53.2 per cent as is the case in Denmark? He knows, he will be able to answer that question I will not.

What influence has that had in reference to the accumulation of wealth? I may state when I was a boy in 1880, they had a depleted soil, practically worth nothing for farming. In 1896 they had started a good business with the other countries and the amount of money which they at that time received for agricultural products exported in excess of the amount they paid out for agricultural products imported was \$28,000,000 a year; that means that among those two or three million people they had \$28,000,000 outside money to distribute. In 1913 this

amount had gradually increased to \$74,000,000. This is all outside money that is distributed among the people in that country. Do you know about the condition of that country today? They are in possession of great wealth. Today they are not doing all the hard work on the farm themselves, but when the harvest time comes they send for the Polish and Russians, and if the Europeans continue the present war then they will eventually employ the Germans, the French, and the English because these latter nations will not have any money and they will have to earn their income wherever it is available.

I want to bring this to you because it confronts us all. If you want to take the fertility of your good Illinois soil and ship it to Europe, all right, do it. If you want to ship it any place, send it to Denmark, because that is my native country and I would rather you would sell it there than anywhere in Europe. There are other countries looking to us for fertility. Ireland, where they have 800 creameries in only one-half of the country, has formerly been considered as a country where they could not grow crops, where it was not possible to make a living. Today as a result of dairying they will import feed stuff and what has been accomplished in Denmark will be repeated here, perhaps at the expense of the Illinois soil.

Sanitation in production of milk should also be emphasized. Milk is the most delicate and the most important food produced. Sixteen per cent of the amount of food that you consume is in the form of dairy products and it is up to you to see that it is produced under the most sanitary conditions. You will be interested in knowing how milk is produced in Holland. Coming into a farm house in Northern Holland we first came into the living rooms on the left side of the hall, and after looking through all the rooms the lady of the house asked if we were interested in seeing the cow stable. We crossed the hall and through a door entered into the stable. We did not find a cow stable there as in this country, it was as clean as any room in the house. Another thing, on one side of the stable were large windows because they fully realize that a cow must have plenty of light and ventilation in order to produce satisfactory re-

sults. We also found that those windows were decorated with white curtains. The stable walls were covered with beautiful pictures and plates were placed on racks in front of the cows. Now I tell you there are many lessons to be learned from this; first, loyalty to the cow. You take in Holland where a cow yields 250 pounds of butter fat per year, it is the cow that is keeping the family. Here in this country it is too often the family that is keeping the cow. The Hollanders, realizing that the cow is keeping the family, feel that it is their duty to provide the best they have for her, and that is the reason that they are all living in the same house, giving the cow just as good care as any member of the family and that is the reason why those people are happy today. That is also a thing which you will have to consider when you go into dairying, you cannot do it as in the far North leave the cows outdoors beside the straw stack through the winter.

It appeals to the consumer to have milk produced in a stable as the one described. The Hollanders are also sanitary in their method of manufacturing the same as they are in the production of milk. The creameries are in a sanitary condition both inside and outside. You teachers will be located in various parts of this state and you should have enough influence so you could improve conditions which are undesirable. We have in Iowa a lady school superintendent who is taking much interest in such work. She has much influence in the creamery, she shows the producer how to care for the milk and cream as well as how the herd should be cared for in order to produce the best returns.

The creamery is an important institution. It represents the dairy industry of its community. Its appearance both outside and inside should be such that it may do credit to the great interest it represents.

**ADDRESS OF MR. T. A. BORMAN, AT SESSION HELD
AT NORMAL COLLEGE, CARBONDALE, ILL.,
JANUARY 26, 1916.**

Mr. Chairman, Young Ladies and Gentlemen: The hands from the young women did not come quite as strong as I would have been pleased to have seen them. I suspect there are young ladies who have milked cows who live on the farm who did not raise their hands. I find that in every community there is a feeling among the men folks as well as among the women folks that dairying is not a woman's job. It is a woman's job—that is my contention; that, except for the cows actually milked by the women of the United States on the farms on which dairy cows are kept, the dairy business of this country would be in a mighty sad plight.

Dairying is a woman's job, but it is not the job for the women that it ought to be. It should be more dignified than it is at the present time. There is no drudgery in dairying if the cows kept on the farm are good cows. It has been my observation that drudgery is attached to a job only in proportion as that job fails to pay well for the effort given it. If dairying is profitable, if it is the kind of dairying we must have in this country to accomplish the results as referred to by previous speakers, we must have profitable dairying, and with that sort of dairying there will be no drudgery.

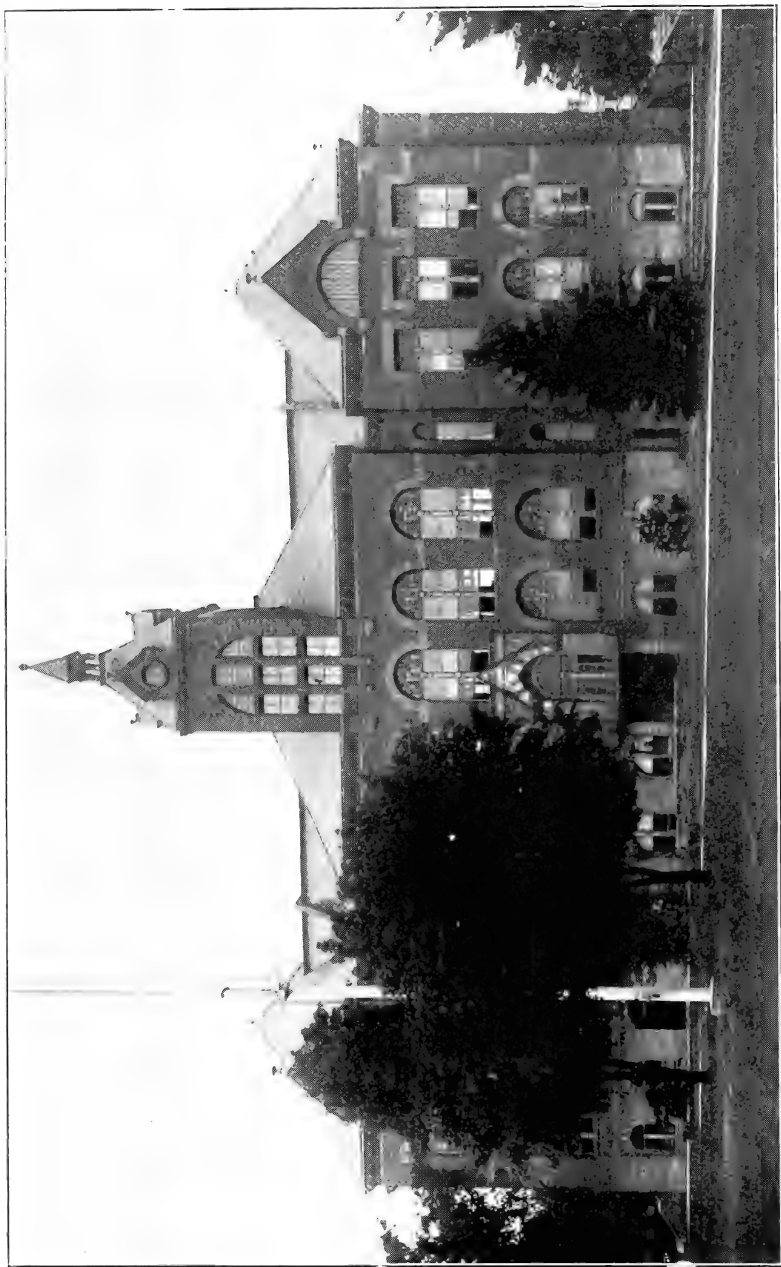
The nearest to a break between my mother and my wife was over the number of pounds of milk in the milk pails. It was whether the cow my wife was milking gave sixty pounds of milk or sixty-one. If it was sixty-one pounds, it was just a little in excess of the cow my mother was milking—that was the point of contention. When you get this dairy business down to the point where you are watching the production of every day and that cow is giving milk for the feed and labor consumed, there will be that interest and all of this talk about drudgery will be forgotten.

So we must dignify this dairy business by an increased pro-

fit. We must not only talk of how to get a good cow, but we must have the good cow. It is within the range of every farmer, every farmer's boy and girl who has the "gumption" to get that cow, and you will have her.

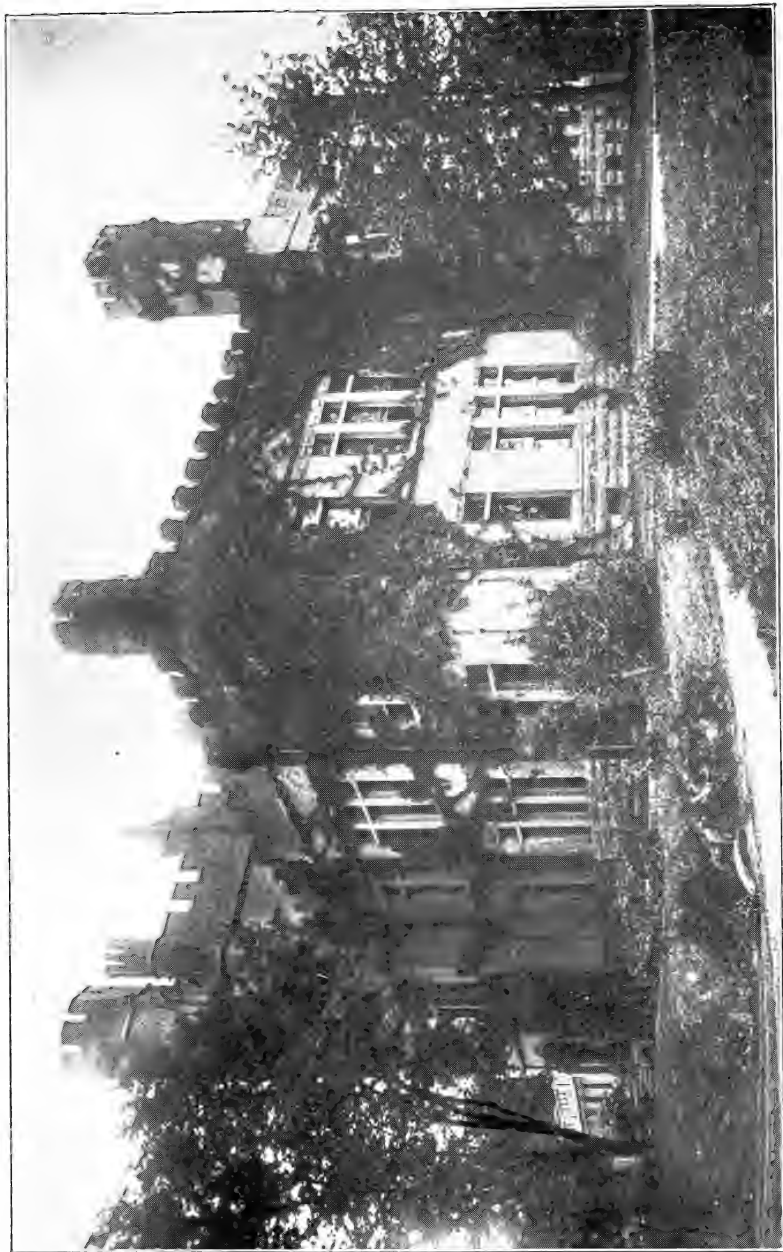
Another point in connection with this business of milking cows by the women folks—through lack of consideration or respect we men folks are dilatory in preparing the sort of milking places we ought to prepare. There is not a man in Illinois who has a herd of ten common cows who cannot dispose of two of the poorest milkers in the bunch and with the money produce the sort of milking place where any woman will not be ashamed to milk. Whether milking will be a pleasure or a drudgery depends a great deal upon the place where the milking is done. The place need not be expensive. A neat, clean milking place can be put up at a small expenditure. If you, young woman, and your mother are called upon to milk in a place which offends your tastes check it up on the boss, he can, if he will, provide a respectable milking place.

It is also vital in this dairy business that we produce clean milk and butter. There is an attack at the present time at the oleo headquarters, on the purity and wholesomeness of butter. It rests with the young men and women of today to change dairying methods, and with that change must come an improved dairy product—it lies within the possibility for us to make this product above reproach. It has been said that it is not suitable for our youngsters to eat. That is a sad mistake. They are succeeding in prejudicing the mind of the public about our butter. It rests with the young people to direct this product to be above reproach which will also increase the consumption of dairy products. People are not using them in the quantity in which they are justified. Butter, cheese and milk are the subjects of attack on every advance in price—no reason why that should be. If we can feed our people better and cheaper, then we must bring about a condition where this consumption is increased; it is costing the farmer more and more each year. He is subject to inspection of one kind and another and his cost is increased. He should have more money and as the commodity becomes better there will be a larger consumption.



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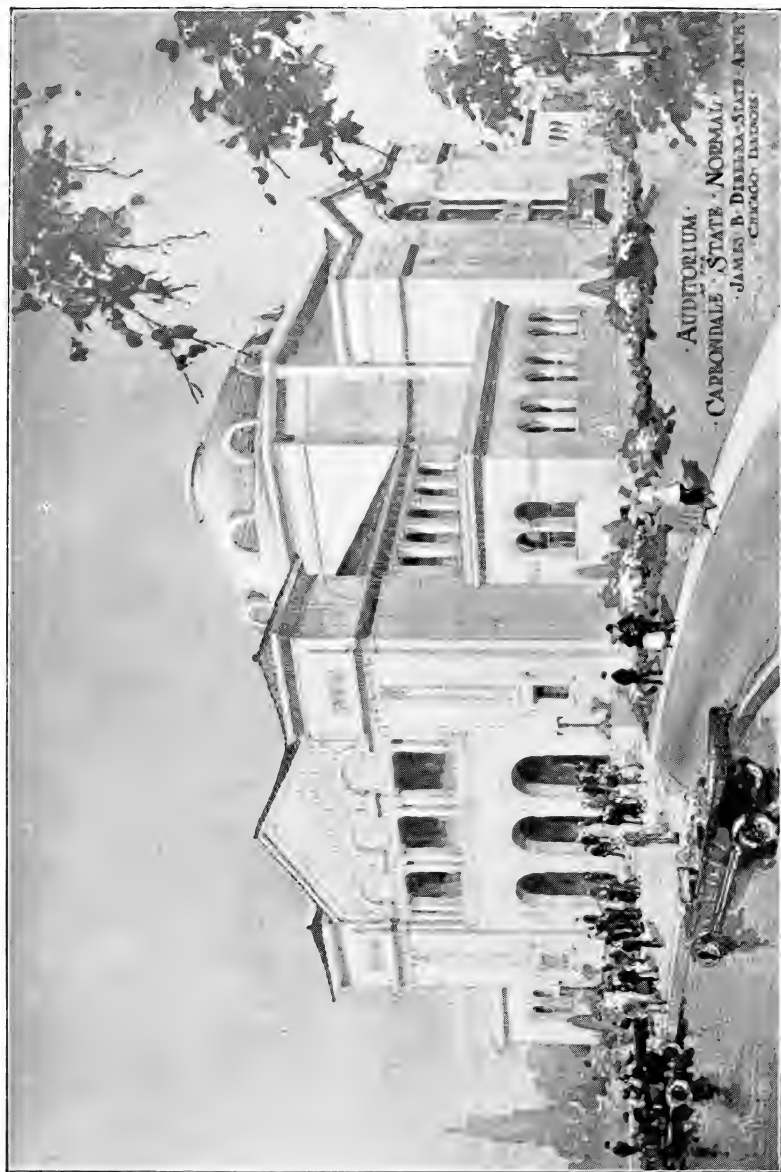
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Journal of Management Education

Then we must consider the future in this business. No man can live for himself alone today without having a dilatory, depreciating effect upon those who follow him. So comes this matter of maintaining soil fertility. You may figure that on your farm you have the fertility necessary to supply your needs while you are on that farm, but there is some one coming after you, and it is an obligation which rests upon you to maintain the fertility of the soil to dignify this calling of dairy to improve the quality of your dairy products, to let nothing happen which will result in its value being depreciated. The future rests in the hands of such bodies as this. I thank you. (Applause.)



**ADDRESS OF PROF. J. D. JARVIS, AT SESSION HELD
AT NORMAL UNIVERSITY, CARBONDALE, ILL.,
JANUARY 26, 1916.**

Ladies, Gentlemen and Fellow Students: I am glad to be with you today because I feel that I am one of you, a little older in years but still I am a student just the same.

We have had some excellent talks regarding the dairy industry and what it means to a community. I believe in the philosophy that you cannot interest a man or woman in a person, business or an association unless you can, in some way, show them wherein they will receive some benefit. This is true with the dairy business, you cannot get men or women to take an interest in the dairy business until you can show them that they will in some way be benefited.

It is said that agriculture is the backbone of this nation, that when the farmer is successful then all other businesses will be successful; when the farmer is not successful, then all other businesses will not be successful. You have had that clearly demonstrated to you during the last year and one-half. While the great nations of Europe are at war, the farmers of the United States are receiving excellent prices for their produce, and they as a class, are prosperous. Their prosperity is felt in all lines of business.

While agriculture is the backbone of this nation, we feel that dairying is the backbone of agriculture or it is "its most essential feature." When the farmer who has tried to get rich by grain farming or cattle ranching, fails, adversity compels him to turn to something which will at least make him a living. Dairying will do that, and is that "make a living first proposition."

If you study the evolution of agriculture, you will find grazing, or ranching, on the cheap fertile, sparsely populated lands. This was true of the old world and also true in this country, and when transportation companies, conveyances of one sort or another, brought more people to these countries, the land enhanced in value and grazing and cattle ranching

were unprofitable. Then the people turned to something else. The large farm areas were divided into smaller farms and grain farming, wheat, oats, flax, etc. was carried on. After a few years this land becomes less productive, the fertility has been taken from the soil and the soil now refuses to grow crops, because in every one hundred bushels of wheat the farmer sold, he removed from his farm \$20 worth of his farm's fertility, and for every one hundred bushels of corn sold he removed \$15 worth of his farm's fertility; but if he sold 2,000 lbs. of butter, he would have removed only fifty cents' worth of his farm's fertility. In other words, it takes \$22,700.00 worth of butter to remove only as much fertility from the soil as there is in one hundred bushels of wheat.

After the small grain period, comes the fat cattle period. In a great many sections of our country the farmers are living in the cattle period and fat cattle raising is unprofitable to the general farmer when the price of corn is from 60 to 80c per bushel, and especially when cattle and hogs are bringing only 6 to 8c per lb. The margin of profit is too small and the general farmers must seek relief in some other kind of farming. He generally turns to dairying, the last stage in the evolution of agriculture.

According to scripture, "That which is first shall be last and that which is last shall be first." In the evolution of agriculture, grazing and ranching were first, and dairying last. Today dairying is becoming first and ranching or grazing is becoming last. Dairying is becoming the nucleus or corner stone in general farming. All other kinds of farming are built around it.

The intelligent dairy farmer of today has a silo to take the place of his grazing or pasture land, because he finds it is real economy to use a silo. Many farmers in the Northern part of this state and in the dairy section of the United States have silos to conserve their farm roughing for feed during summer and winter. They are also learning the advantages of winter dairying, which are: A greater milk production, better prices for milk and butter fat, better quality of calves, hence better

dairy cattle, and better prices for their crops which can be fed to their live-stock at that season of the year. Winter dairying enables the farmer to employ the best kind of labor because he gives steady employment throughout the entire year. Short time positions do not attract the best kind of labor. When business methods are applied to dairying, profits will be earned and the farmer will be enthused and benefited.

Before I close I want to say a word of encouragement to the young men and women who are looking for a higher education, and who do not have sufficient funds to assist them, or who do not have parents able to pay for their college education. There is an opportunity for everyone to get a college education if you so desire. I am not talking from theory but from practical experience. I was reared in the hills of Western Wisconsin and I am very modest to tell you that I am the thirteenth member in my father's family of sixteen. You can see what chance I had for a college education. I was very unfortunate to be turned out into the world at the age of ten, but with the encouragement I received from my father and the older members of my family, ever since ten years of age I have been self supporting. When I became of age I desired a college education, so I took what little money I had, the sum total of \$45.00, and started for Madison, Wisconsin, to get a four years' training in the science of agriculture. Three weeks after I was there I was broke and sick abed, but I was not discouraged because I knew many young men who were in the same predicament as myself and they were partially or wholly self supporting. I succeeded at working at odd jobs on the college farm and in the city of Madison, and when I graduated I had money on deposit in a city bank. I am talking very plain, but I hope it will give you young men encouragement so that if you desire a college education, you can do what thousands of other boys are doing every year in the colleges of this country, working their way through college.

The average person gets a great deal more out of the people he meets than he does out of the books he reads. We learn that this is one of the greatest educational features we

have so before I go, I want to leave a word of encouragement, make use of the experiences of others! We often, however, pay very little attention to the experiences of others until we too have suffered the same bitter pill of experience. We do not appreciate money until we have been financially embarrassed and dollars look like wagon wheels. We do not appreciate good health until we are sick abed, and then we are willing to give attention to our health. We do not appreciate the things which have been told us until we have been brought face to face with those same things. In the words of Dr. David Starr Jordan "Only that becomes real and helpful to any man which has cost him the sweat of his brow, the effort of his brain or the anguish of his soul and he who would be wise must daily earn his wisdom."

Mr. W. W. Marple: "I move that we extend a vote of thanks to this institution for having invited us out here today to hold our morning session in the presence of this inspiring audience."

Motion seconded and carried. (Applause.)

Song: "Alma Mater" by the students.

Selection by the orchestra.

QUALITY IN BUTTER AND HOW TO SECURE IT.

By N. W. Hepburn.

There has been some little misunderstanding regarding the subject of this address as it appears on the program and I am following your secretary's first suggestion of a topic, namely, that of quality in butter and how to secure it. In accepting such an invitation I realize full well the largeness of the task and my total inability to adequately treat the subject. For while the subject of quality in butter has been discussed for almost twenty years at almost every important meeting held in the name of the dairymen it is being solved only little by little.

In thinking of the annual meeting of the Dairymen's Association in the state of Illinois, it has seemed to me that one of the reasons for this annual gathering is to collect and compile material which is suggestive of the current thought running through the minds of those who are thinking most about dairying and its problems. If this is true, I should say at the outset that the dairying manufacturing interests of our state have during the last four years been making history and progress which is well worth recording. It is true that large interests and large bodies move slowly and what seems in itself only a small fraction of what should be done aggregates in total an immeasurable quantity. In order to have a proper perspective for what I want to say, let me give you briefly that part of the history of dairying in the state of Illinois which relates particularly to the manufacturing interests.

For our purposes the industry may be said to have begun in this country with the first importation of dairy cattle, which was about the year 1824.

It is of interest and importance for us to know that in spite of the fact that the practice of the industry is old in years, the science of the industry is new and its development is practically within the memory of everyone of us. Some of the first at-

tempts to make scientific applications to dairying were the development of the silo for a specialized dairy feed, which came about in Maryland in 1876, 40 years ago; the development of pasteurization of milk and of cream for buttermaking, the first records of which are not more than 25 years old; and the use of starters in buttermaking which has been practiced for only about 25 years. So far as this part of the industry is concerned you have seen and followed these applications made to dairy manufactures from the very beginning and in the light of what has happened during these 25 years who would dare to predict the future of dairying in Illinois for the next 25 years or even for the next 10 years.

The dairy industry in our own state dates back to about 1835 with the coming of the first white settlers. Dairying then consisted only in the keeping of a cow for the milk, cream and butter she might produce for the family.

It is interesting to note that back in those days, Wood a historian, writes that butter sold for 12½ cents a pound in summer and 25 cents a pound in winter. So then as now there existed the wide variations in summer and winter prices.

Naturally, as soon as more cows than enough to supply home demands were kept, one of the first forms of commercializing the industry was that of selling whole milk. This branch of the industry may be said to have begun in 1852 when P. H. Smith of Elgin took one 8-gallon can of milk to the Northwestern station and shipped it to the one city hotel in Chicago. From that time until now the industry has grown until we could not measure the calamity that would result if the supply of 18,000 such cans were shut off from the city of Chicago for a single day. Our last census report shows that half the milk produced is now sold in that form for direct consumption.

In 1877 the Chicago Journal published the following article which not only shows the development of the city milk supply business, but also gives the public view of the business at that time.

"The item of milk for daily consumption in a city like Chicago is something enormous. This supply must come from

the rural districts, and within a limited range, as it is not found desirable to transport the fluid too great a distance. Coming pure from the farms, it might become butter if indulged with too long a ride. The great bulk of the supply for Chicago comes from Cook, DuPage, Kane and McHenry counties, the famous Fox River Valley furnishing three-fourths. Throughout these counties are hundreds of splendid farms entirely devoted to dairying, and the milk is either shipped to Chicago by rail or sold to the numerous factories where it is manufactured into butter and cheese."

Another branch of this same industry, growing largely under the direction of the scientist is the certified milk industry, and while I do not wish to dwell on this phase of the subject it is worthy of comment that the first certified milk of which we have any record was that shipped by H. B. Gurler, one of the pioneers in dairying, from this state to the Paris Exposition in 1900. To show you that even at that time Mr. Gurler had the correct fundamental idea the details of which are still being studied concerning the production of certified milk I want to read you a short letter written by him with reference to this first certified milk.

"Last August I got a letter from abroad requesting me to send some milk. The idea of my sending milk across the Atlantic with any expectation of getting it there sweet! I put it up on the evening of August 29th, milk taken without any especial care; took the milk as it came in for the milk bottles not knowing what cows it came from. When I got ready I took milk right from those bottling machines and put them into cases and they went to cooling. This is where the extra work came in, cooling the milk as rapidly as possible. The next morning it was packed and shipped by express to New York; then it was put on board a vessel, in the refrigerator, and started for Paris, reaching there September 15th. The professor wrote me that the milk reached there September 15th in fine condition. They found it acid on the 19th, but just when between the 15th and the 19th it turned I don't know. Well now that milk was not pasteurized, sterilized or embalmed. I just want to show you what can

be done with milk by the proper sanitary conditions and cooling it rapidly, as soon as possible after milking."

About the year 1860 the number of dairy cows kept had grown to such an extent that more milk was produced than could be handled as such, and with this over-supply came the temporary rise of the cheese industry in Illinois. I am giving rather fully the details of the rise and fall of that industry since it involves a principle not to be overlooked in any system of manufacturing, especially that of edible and perishable products.

The following from an address by J. H. Wanzer, one of our pioneer dairymen, gives an account of the early start of the cheese industry in Illinois:

"We remember our first experiment in making cheese. We had, on a June morning in 1860, taken our milk to Elgin, but, finding the previous day's milk had been returned with notice that they were so flooded with milk that they could not use any more of ours for some time to come, we took the previous day's milk into the wagon with that just brought and started for home, calling at the grocery of James Knott, purchasing a large wash tub, and a little farther on to the meat market of George Roberts and bought a calf's rennet, and upon our arrival home under the directions of Mother Herrick made our first cheese, putting it to press under a temporarily constructed press and to curing in one of the rooms of the house. We soon partitioned off a part of the woodshed and obtained a larger wooden tub, with a smaller tin tub to go inside of the wooden one, heating our milk and whey by warming water on the stove and turning it between the two tubs. Thus we worked for three seasons, curing our cheese in a part of our house. In 1867 Father Herrick built a small cheese factory, 16 by 40 feet, and purchased a cheese vat and screw presses from H. A. Rowe, Hudson, Ohio. In this small factory we made the cheese from the milk of our own cows, which had increased from 15 to 40 cows, and as the supply far exceeded the milk demand of Chicago, we commenced to take in milk from our neighbors, after running up our vat full three times a day. We have always carried the impression that this little cheese factory, 16 by 40 feet, was the first west

of Chicago where milk was received and made up on the dividend plan. Thus we labored on, releasing the overburdened milk market, taking our cheese loose in wagons, principally to Chicago, in warm weather going all the way by night. We remember reaching South Water street one morning in the summer of '63. Meeting Mike Daris, who got upon our wagon, lifting the sheet that kept the dust off our cheese, offering us 21 cents per pound for the load, we closed a bargain at 22 cents and in less than one hour had unloaded and received our pay, \$462, reaching home in time to do our milking that night.

About this time commenced our real struggle for life in the dairy world. Our home markets were supplied and a different article must be made to meet the wants of the export trade. Repeated failures had been made by those coming from the large cheese districts of the east. We began to realize that our water, grasses, and climate imparted different qualities to our milk, and a manipulating process must be worked out to meet the peculiarities of our milk and markets. We must cut loose from the east and secure success through our own efforts. The east were lavish with their predictions concerning our ultimate failure in the west, and but for the stamina of the pioneers of associated dairying in the west, we might today be struggling on in a half-developed state instead of being the bright and shining star of all the world, as we are. How eagerly we caught at ideas that would lead to the unraveling of the tangled yarn. How glad to impart one to another any points gained in the struggle for existence. I never shall forget the hearing of a rap upon my door at midnight in July 1867. Upon opening I found O. K. Watts, all the way from Sycamore, 22 miles, after making his cheese, to get light and to give light. The wee hours of the morning found us in serious consultation over this matter of adapting our methods of manufacture to our milk and markets, he driving back to make his cheese. I remember at another time Robert Stewart, on his way to Chicago, stopped over a train and walked out two miles to communicate to me some point he had gained in cheese-making. Robert Stewart was always in a hurry to do his brother manufacturer good."

Dairy herds were rapidly increasing and the co-operative system was soon inaugurated. Instead of looking for a purchaser, the purchaser came to the manufacturer. The Elgin Board of Trade was established in 1872, where purchaser could meet on middle ground.

Following the introduction of the filled cheese, which was an attempt to make larger profits on this much sought after product, the dealer soon began to complain, and there was no longer the great demand for Illinois cheese. The reputation of Illinois cheese was gone. It was useless to try to regain it. In 1865 Illinois had 17 cheese factories, which had increased to 46 in 1870. By 1890 many factories were engaged in the manufacture of filled cheese. This industry increased rapidly until about 1896 when a law was passed prohibiting filled cheese. Within a few months Illinois dropped almost to the bottom as a cheese producing state. Today there are only about fifteen factories making cheese.

Following closely on the fall of the cheese industry we read of the development of the creamery industry which in the main is familiar to most of you.

About 1870 the matter of establishing a creamery in Elgin began to be discussed, and it was Dr. Joseph Tefft of Elgin who was instrumental in establishing the first butter factory west of the lakes. It was here, in a factory superintended by J. H. Wanzer, with the help of some of the stockholders' wives, that the first creamery butter west of the lakes was made. The second season this factory made 80,000 pounds of butter. For a time many factories made both butter and cheese, and even now we find scattered over the state creameries which were originally designed for the dual purpose of manufacturing both cheese and butter.

The second creamery was probably that of I. A. Bois of Marengo. Thus the industry was developed until in 1883 there were about 400 factories. In 1885 one of the first creameries opened in southern Illinois at Sparta. From this time on the industry grew rapidly until 1898 at which time there were over 500 factories in Illinois. The accompanying map gives a pret-

ty good idea of the location and grouping of creameries in the state at the present time.

From this time on you are more familiar than I with the rapid change which has come about in the creamery business.

The introduction of the hand separator has so changed the face of the creamery branch of dairy manufacture that it would scarcely be recognized by a buttermaker of the so-called old school.

The hand separator, however, is a modern institution and its almost universal use is an illustration of one of those violent changes which 20 years ago would have been considered impossible. It is difficult sometimes to realize that we have passed through a period of transition where the character of dairying followed has been totally transformed by the introduction of a new system. However, the advantages which have come to both producer and manufacturer, through the introduction of the hand separator system, have made it a popular institution and no one can question certain benefits which have been derived from its use, and no one can dispute those attractive features which have conspired to popularize the system.

The new system, as the old, carries with it its own special problems and when we are inclined to be discouraged with regard to the outcome of this last departure we do well to remember that it is still in its infancy and the wonder is that producer and manufacturer have worked well enough together to make it go as well as it does.

However no manufacturer feels that this fact excuses him from grappling with the current problems for the purpose of improving and perfecting the system. As was intimated at the outset, it is not the purpose of this paper to give you my opinions of the methods to be pursued in effecting a cure for the lack of quality, but to tell you of some of the steps which have been taken by our Illinois manufacturers to safeguard these conditions. Some of you are familiar with the fact that Illinois can boast of three well-organized creamery clubs, representing the central, southern and northern sections of the state. In addition to this there is a state organization representing all the manu-

facturing interests. This act of organizing the manufacturing forces we cannot fail to recognize as a piece of farsightedness looking toward improvement in every direction pertaining to their industry.

Now problems other than those of quality attend the operation of a well-regulated creamery in these days. However, as soon as the more pressing of these problems had been cared for it is a significant fact that these bodies came together and discussed most earnestly the question of quality in butter and how to secure it. This fact, I repeat, that these men were willing even when conditions were not very bad to come together and spend their time and money in discussing a question of this sort, in large part at least from the philanthropic point of view, is significant. True they expected personal returns for this effort, but this was not where the stress was laid in their discussion. Now when you talk with these men individually they say that nothing has been accomplished. I read to you in the fore part of this paper some bits of the history of dairying as it has occurred in Illinois, largely to say that in the light of what has happened in the dairy world since 1852 much has been accomplished. Do you suppose that P. H. Smith could ship milk into Chicago the same way that he did in 1852? I should say not. Or do you suppose that Dr. Joseph Tefft's creamery would pass the laws of the present day with regard to sanitation and did he protect his consumers by a perfect system of pasteurization of the cream before it was made into butter? He did not. So these things are all measured relatively and if you are inclined to doubt that the systems of manufacturing are better today than they were years ago, go and ask some of the old-time buttermakers how they used to make their product. Now when I tell you that the first creamery club was organized in the central part of the state in November 1912, that the Illinois Butter Manufacturers' Improvement Association was organized in April 1911, that the Southern Club was organized some time in 1914, you ought not to expect too much progress in that short period of time. But let me call your attention to some of the things that have happened in that brief period of three or four

years of activity. I am going to give you the facts which I feel are deserving of publicity and which the creamerymen have been too modest to exploit, even though it would have been much to their advantage to do so.

I am doing this on my own initiative so I suppose that I shall have to suffer the consequence at the hands of the creamerymen when I have finished. One of the first meetings at which grading was discussed in a large way was held at Springfield in September 1914, and at that time a committee was appointed to confer with the Illinois State Food Commission regarding the possibility of rules and regulations and methods that might be adopted for the classification of cream to be used in buttermaking. From this time on the question of the grading of cream and paying for it on the basis of the kind of butter it would produce was the central theme of discussion at almost every meeting of both the central and southern clubs and you will remember that these meetings occurred monthly.

The next significant meeting was held at Centralia where Professor Bouska presented some very significant data showing the relation between mean daily temperature and acidity and in turn the effect of acidity on quality of cream. On the same occasion data from the Department of Dairy Husbandry of the University of Illinois were presented, the results of which corroborated Professor Bouska's data. At this meeting it was thoroughly agreed that the only sane method to pursue in securing a better grade of cream, and thereby improve the quality of butter made, was to classify the cream as it reached the creamery and pay not only on the basis of its fat content but also on its qualification for being manufactured into a high grade butter. It was felt at this time that there was a lack of uniformity of opinion among buttermakers as to what should constitute first, second and third grade cream and it was consequently agreed to have a cream grading class at the next month-meeting. This meeting was held at Urbana in March 1915 and a class in cream grading was conducted by the Dairy Department assisted by Professor Bouska and Mr. John B. Newman of the State Food Commission.

A brief description of the method of conducting this class may not be out of place. Thirty-two samples of cream were collected at the Twin City Creamery representing all the varieties from good to very bad cream. One-half of these samples were churned and made into butter in the regular manner. On the following day the butter and a part of the sample of cream from which it came were passed around for examination by the members of the creamery club assembled, at which time all information concerning the sample of cream was given by one of the instructors, and at the same time a score was assigned to each piece of butter. It should be noted that this was the meeting at which the Commissioners' bulletin describing standards for grading was given out. This procedure was repeated at Chicago, Centralia, Mt. Vernon and St. Louis, and served at least to emphasize the fact that poor cream will not make good butter; also that after all, the judgment of the members present did not vary greatly on the question of what constituted good and poor quality. One of the most interesting of this series of meetings was held a few weeks later in Chicago, where a new feature was introduced by Professor McKay. This consisted in a description of a cream cooling tank which could be purchased at a minimum cost and used by the farmers for controlling temperature, which as had been previously pointed out is the most potent factor in controlling the quality of cream. It was at this meeting that the Illinois boys decided to adopt the slogan "Cool Your Cream." It was about this time also that it was agreed by each of the clubs that its members would begin to grade cream on the basis described in the Commission bulletin. That grading was actually instituted in many creameries at that time is evidenced by experiences in grading as reported by individual members at subsequent meetings. One of the largest meetings ever held was in Peoria where nearly 100 creamerymen were present. Methods for perfecting the grading system were fully discussed.

I hope you will realize that at best this could be only a very brief and imperfect summary of what has actually taken place, but certainly the sort of work here briefly described is worthy

of publicity and deserving of the support of every producer, manufacturer and consumer. As far as the meetings of the clubs themselves are concerned I can assure you that their power in dispelling petty competition and their power in promoting good fellowship would justify their existence if none of the work described had been considered.

There is much left to do which is well within the province of the creamery clubs and I solicit the energy and support of the Dairymen of the State of Illinois and particularly that of this Dairymen's Association in pushing this work forward to the end that one of the great industries of the state, dairying, shall be bigger, better and on a truly sound scientific basis.



PASTEURIZATION.

Prof. M. Mortensen, Iowa State College.

There is today a greater demand for sanitary food products than ever before. More strict attention is given to the production, manufacturing and handling of all food products. The consumers demand sanitary foods and as a result thereof the producer if he is a man of good judgment and of business ability will naturally put himself in a position to furnish what people want.

The consumers have at present directed their attention particularly to milk and milk products such as butter, cheese and ice cream. It is well known that milk is an admirable medium for the growth of a great many species of bacteria. Most of these organisms, however, may be considered harmless though some of the pathogenic micro-organisms are also frequently found in milk; as the most common of these may be considered those causing tuberculosis less frequently may be found organisms such as those producing typhoid fever, diphtheria, scarlet fever and dysentery. Diseases such as those mentioned have often been attributed to the use of unpasteurized milk, and it is reasonable to suppose that butter made from raw cream and oleo made from fats and milk not properly heated might to a certain degree become dangerous although but extremely few instances are on record which would indicate that butter has been the direct cause of disease. Nevertheless in order to be absolutely safe it is not unreasonable that the consumers demand that all dairy products as well as such products as oleo be manufactured only from pasteurized material.

A big percentage of our middle western creameries are pasteurizing today and have been pasteurizing for years and most of those who are not already pasteurizing are fast getting ready therefor. Much of the milk and cream sold especially in the smaller cities is sold in raw condition, however, in some of the cities good pasteurized milk and cream may be obtained.

It may be of interest to know why the idea of pasteurization has not spread more rapidly. The manufacturers and dealers have often been accused for not being progressive along that line. It is a fact, however, that the manufacturers of dairy products as a class have not spared any money or effort in the matter of improving their products and giving the consumers what they desire but the greater hindrance in the past has been that the consumers were not in favor of pasteurized milk or of dairy products made from pasteurized milk or cream. Even prominent physicians have been strongly opposed to pasteurization and through their writings and speeches have done much toward keeping up the prejudice of the consumers.

This attitude of disinterest toward the subject of pasteurization was plainly indicated a year ago in Iowa when the State Butter Makers Association of that state in co-operation with the Iowa Dairymen's Association presented a bill to the legislature making pasteurization of cream for buttermaking compulsory. No physician appeared to fight for the passage of such a measure. No representative appeared from any of the women's organizations, consequently the members of the legislature evidently considered the measure as unimportant or they possibly considered it as a measure recommended by the Iowa Creamerymen for the purpose of obtaining special personal advantage, and as a consequence it was not accepted. This measure will be presented to the members of the Iowa legislature when they meet again and we shall make a special appeal to the physicians of our state as we need their help. We need the help and assistance of the women who should be vitally interested in the passage of such measure.

There may be two principal reasons for the physicians taking an unfavorable attitude toward pasteurization: First, the changes brought about in the milk by pasteurization were not fully understood and much less was known about the value of pasteurized milk as a food for infants. Second, The pasteurizing process was for a long time not fully understood by the manufacturers. The term "commercial pasteurization" did therefore not mean much. It would most often indicate that the milk

would have a cooked flavor which was objectionable to most consumers.

Although there is yet much to be learned on the subject of pasteurization fairly reliable information is today at hand. It is true that the milk solids are changed somewhat when exposed to a high temperature. Some of these become less soluble and therefore more difficult to digest. Even this being true Cronheim and Erich Miller from 1903 and 1908 made raw and sterilized milk tests with children, both healthy children and children having rachitis. They were unable to establish any difference in favor of either milk when fed to healthy children nor was there any marked difference in the rachitic children.

By the modern method of pasteurization milk is not heated to such a high temperature so it will influence the chemical composition to any noticeable extent. A temperature of 140 to 145 degrees F. if applied for from 20 to 25 minutes is sufficient to destroy all the pathogenic organisms found in milk. The flash method of pasteurization by which the milk has to be heated from 180 degrees F. to 185 degrees F. is now less commonly employed. The modern method of pasteurization does not impair the milk but even improves it as a food for infants. This is demonstrated by the following experiments: During the period between April 24th and Oct. 17, 1913 eight baby stations were maintained by Mr. Geo. M. Oyster, Jr., in different sections of Washington for the purpose of dispensing milk to the babies of the poor. This work was carried on in co-operation with about twenty physicians and several graduate nurses. Of the 1,018 babies furnished with milk from these stations some were fed on raw, others on pasteurized, while some were at alternate periods fed on raw and pasteurized milk. The highest gain in weight was obtained by the babies fed on pasteurized milk and from the third lot it was obtained during the periods when the babies were fed on pasteurized milk which all goes to prove that the old supposition that pasteurization is injurious to the milk is not well founded.

It can not be denied that there are few creamery managers that have been opposed to pasteurization. This opposition has been largely overcome at present. The principal reasons for

such objections was to some extent lack of knowledge in regard to pasteurization. Some were of the opinion that the cost of pasteurizing, including fat losses in the butter milk, would be enormous. Experiments conducted at the Iowa Experiment Station reports of which is published in the Iowa Bulletin No. 156 indicate that fat losses in the butter milk are greater from raw cream when compared with that of sweet cream pasteurized. If the cream however, is pasteurized in sour condition then the per cent of butter fat lost in the butter milk is slightly greater from the pasteurized than from the raw cream.

The cost of pasteurization in a small plant, figuring cost of steam, water, interest and depreciation on investment, insurance, etc., may be estimated for the flash method at about 0.6c per pound of butter fat figuring the fat content of the cream at 30 per cent. By the vat method this figure will be reduced to about 0.45c per pound of butter fat. For a large creamery these figures will be slightly reduced, a further reduction in cost may be made if pasteurization can be done with exhaust steam. Bowen (Bull. 85 B. A. I.) gives the cost of pasteurizing one gallon of milk at 0.313c and for one gallon cream at 0.634c but these figures include only cost of steam and water.

As this gathering largely is composed of men interested in the manufacture of dairy products some of the practical problems evolved in the process of pasteurization will naturally be of some interest. In taking up such problems for discussion it will be convenient to distinguish between the operation in the whole milk creamery and in the gathered cream plant.

Pasteurization in the Whole Milk Plant: This may be done in two ways, either the milk may be pasteurized before separation or the cream pasteurized after separation. By the former method the flash heat system is to be preferred the milk being heated to a temperature of from 180 degrees F. to 185 degrees F. and cooled to about 80 or 90 degrees F. before entering the separator. The cream is then cooled to ripening temperature. By the latter method the cream is pasteurized after skimming and may be accomplished either by employing the flash heat or the prolonged heat or vat method. The cream by the latter

method is heated to from 140 to 145 degrees F. at which temperature it is held for twenty to twenty-five minutes, this being the condition under which all pathogenic organisms are destroyed.

From experimental work conducted at the Iowa Station slightly better results were obtained by the vat method of pasteurization and the flavor of the butter made from pasteurized cream scored higher and possessed better keeping qualities than that made from raw cream. Pasteurized cream butter when sweet cream was used in our experiments, contained slightly less moisture, but the same amount of casein as did butter made from raw cream.

In the case of the sweet cream the body was not injured to any extent by pasteurization and there was practically no difference between the body of the butter obtained from the pasteurized cream and that obtained from raw cream.

Pasteurization in the Gathered Cream Plant: When sour cream is pasteurized both the continuous method and the vat method of pasteurization may be employed. When pasteurizing by the continuous method of flash heat, the cream should be heated to a temperature of from 180 to 185 degrees F. From the pasteurizer it is cooled immediately either to ripening or churning temperature. It has been found advisable by a number of creamery men to cool the cream immediately to churning temperature, add a big starter and allow the cream to remain at that temperature for a few hours before churning. Others have found that butter made from cream pasteurized in the vat received a higher score on flavor, as an average, the gain being about two points above the score of the raw cream butter and over a point above the score on butter made from cream pasteurized by the flash method.

The casein content of the butter is lower when pasteurizing sour cream than when pasturizing sweet cream. This is evidently due to the fact that when sour cream is pasteurized the casein in the presence of acid is acted upon by the heat forming small hard casein particles. These particles are readily removed from the butter with the buttermilk and wash water whereas in

the case of the sweet cream pasturization such changes do not take place as the heat does not influence the character of the casein except in the presence of a certain amount of acid.

It appears as if butter made from sour cream pasteurized in the cream ripener contains a higher moisture content than that made from cream pasturized by the continuous method. Furthermore the body of the butter manufactured from the former is also slightly weaker and injured. This condition of the body is evidently the cause for the increased moisture content of the butter. Therefore when the cream has been exposed to a high heat for some time it will usually result in that the butter produced will contain as high or higher moisture content than the butter made from raw cream.

There is yet much to be learned in reference to pasteurization. Many problems have not so far been touched upon by the experiment Stations. It is, however, the general opinion among the buttermakers that pasteurization should be made compulsory as there is evidently no factor which at the present time will tend more toward creating an enviable reputation for the American butter than that of compulsory pasteurization.



INCREASING THE VALUE OF OUR DAIRY PRODUCTS.

**By F. W. Bousha, Assistant to Sec. G. L. McKay, of the
American Asso. of Creamery Butter Manufacturers,
Chicago.**

By the value of a dairy product might be understood, the price at which it sells. That is how much money it costs the consumer and how much money it yields the producer. It might mean utility or intrinsic value. That is how it serves the consumer for the purpose for which he obtained it.

It is natural for dairymen to want a better reward for their efforts. A better reward justly earned is an index of efficiency and usefulness to society. From a viewpoint of public policy a better reward obtained by such methods is desirable and praiseworthy. An increase in price to the consumer without being founded upon a decreased supply, increased cost of production or increased utility is unjustifiable and against economic policy.

The eighteenth Report of the Commissioner of Labor, page 847, shows that in the period from 1890 to 1903 there was no substantial upward or downward course in the relative price of butter.

The period from 1907 to 1913 I find in the Statistical Abstract of the U. S. 1914

Relative Retail Price of Butter.

1907	84.1
1908	85.7
1909	90.2
1910	94.0
1911	87.6
1912	97.4
1913	100.0

The average price for 1913 is taken as a basis 100. These figures show an upward trend in the price of butter. These are the latest available figures.

From the above mentioned Statistical abstract, I calculate the yearly per capita production of butter as follows:

Year	Lbs. per Capita
1850	13.6
1860	14.8
1870	13.5
1880	16.1
1890	19.1
1900	19.4
1910	17.4
Gain in population in 1900-1910	20.3%
Gain in butter 1899-1909	8.5%
10.3% less butter per capita in 1909 than in 1900.	

The supply of dairy products this year is more abundant, but it is yet to be seen whether this is the temporary result of a wet season or a permanent change in the industry.

Hence a higher price of butter is consistent with supply and demand. The farmer has received 95% of this advance in price. In the last decade his land has nearly doubled in cost, and the cost of his labor has grown considerably, thus increasing his cost of production. By the expenditure of more sanitary barns and labor the farmer is producing a more wholesome product but at greater cost.

Increased demand, decreased supply, and increased cost of production justify an advance in the price of butter. But the price has advanced very little. The reason for that is that a retail price of 40 cents a pound is to the limit of what the majority of consumers think they can afford to pay. An excessive price of butter curtails consumption and drives people to substitutes. When the price falls to normal levels consumption does not respond and prices fall abnormally low. Thus the producer suffers a loss in the end because the high price was for a small volume and the low price is for a large volume.

The winter price of the best grade of butter is as high as the consumer can afford to pay and the dairyman cannot expect a better reward from an increase in price of such butter.

But only 15% of the creamery butter sells for the highest price. The other 85% and the majority of farm made butter sell for about four cents less because the flavor is not so good. Hence the farmers fail to get \$50,000,000 a year because they neglect flavor.

The majority of the farmers fail to get the benefit of the high butter price because they produce most of their butterfat in summer when there is a surplus of it and it is cheap. What they remember and talk all the time is the low price in the summer. What the consumer remembers longest and talks all the time is the high price he has to pay in the winter.

The market milk conditions resemble the butter situation. The increased cost of land, labor, buildings and sanitation have increased the cost of producing milk. The consumer is paying all the price he thinks he can afford. An advance in the price results in decreased consumption. A special grade of better milk at a higher price finds only a small sale in the large cities.

Therefore, the belief of the consumer that he cannot afford to pay more than the present top prices for butter, milk, and cream makes it impossible to increase the dairyman's profit by a higher top price. But the majority of the dairymen do not get the top prices because their product lacks flavor or is produced in the summer when there is a surplus.

Winter dairying brings the best prices. It equalizes farm labor giving more to do during the slack season. Calves born in the fall and winter are less liable to scours. They get the benefit of pasture when ready for it while the summer calf has to be winter fed after it is weaned. Absence of flies, heat, and the demands of sowing, haying, and harvesting make milking a pleasanter chore in the winter.

Lack of cooling causes most of the lack of flavor in dairy products. Milk and cream should be cooled as low and as soon as possible. Running spring or well water, or ice will do this. Cream just skimmed should not be mixed with previous skimmings until it is well cooled. This should be done in a narrow can set in cold water. Water cools twenty-five times as fast as air. Milk and cream properly cooled in water keep sweet two to three days in the summer.

The farmer can build his own cooling tank. For this purpose plans and specifications can be obtained free upon request to the dairy schools and creameries. Those who do not wish to build a tank can buy one. I have made temperature tests of a number of tanks. Wooden tanks and metal tanks insulated with cork, flax fibre, and lith at 3 degrees below zero withstood freezing 48 hours. A metal tank with especially thick insulation withstood freezing for sixty hours. At 95 degrees, which is very hot, these tanks held the temperature below 60 degrees for 12 hours. The especially insulated tank held the temperature below 60 degrees longer than 24 hours.

Keeping cream cold will protect against injury to flavor if the cream is delivered promptly to the creamery. It should be delivered at least every two days in the summer and at least every three days in the winter.

The dairyman's profit is the difference between the cost of production and the selling price. Reducing the cost of production ten per cent increases the profit just as much, as increasing the selling price ten per cent.

Profiting by reducing the cost of production is in harmony with public policy. It is a problem right at home on the farm and therefore more under the dairyman's control than price problems in distant cities. It affords as great opportunities for profit as increasing the price. Cost can be reduced by increasing soil fertility, labor saving methods and equipment, better crops, better storage of crops, and better cows. The possibilities here are wonderful and as great as those afforded by any other business.

The quality of an article has a great deal to do with the way the price looks to the consumer. Forty cents a pound does not look quite so big if the quality is excellent. The worthiest labor of all has to do with increasing the intrinsic value or utility of dairy products to the consumer. To do this the highest quality should be the aim. Flavor and every other quality should be good. The methods of making and packing should insure keeping quality. The packages should protect against external injuries to keeping quality, appearance, and loss of weight. Milk

for infants and invalids should be of certified quality. Pasteurized butter is as safe from disease as any food can be made. The pasteurization gives it the very best keeping quality. The more uniform the quality the better pleased is the consumer. Giving the consumer an excellent product at one time and an average product another time provokes more complaint than furnishing him an average product all the time. A brand on a product enables the consumer to buy again the product which he found good and to avoid the product which he found poor. If the product is not branded the consumer might go to another store to seek relief and there have the same unbranded product thrust upon him.

Cleanliness certainly pays well in quality of dairy products. But even if it did not pay, no dairyman could say that he would be dirty unless some one paid him for the effort to clean up. I know it costs to keep clean but the dairyman keeps clean because it is a moral obligation and not a question of pay.

A product that is healthful has greater intrinsic value to the consumer than a product that might communicate disease. The responsibility and cost of producing a disease free product is a burden which the dairyman must bear. Cleanliness, health of attendants and the herd, and certification or pasteurization protect the consumer adequately.

One of the marks of the times are drastic statements about the bad condition, unhealthfulness and exorbitant prices of foods. There is an impression that only those who tell how bad and dear food is, are truthful and disinterested; that those who have anything good to say about food are selfish and untruthful. Persons who use sensational superlatives and assert that all of a certain food is unfit to eat, and that all the producers of that food are what they should not be, receive vastly more publicity than those who express themselves in the language of polite society and do not believe every one wrong and all of a food unfit to eat. I believe that the first right to speak for or against food belongs to the consumer and to those whose living depends upon supplying food.

Consumers have been prejudiced against dairy products by misrepresentation and exaggeration. To have the consumer

appreciate the value of dairy products an educational campaign is necessary; for this purpose I give the following facts upon the nutritive and dietetic value of butter.

December 10, 1915, a well known first class grocery sold butter to the consumer in Chicago at 38 cents a pound. For this price they obtained a certain amount of nutrients and economic service. At the prices which prevailed for the best goods at that store, ten cents would have bought the following number of calories in the foods given, calculated from "The Principles of Human Nutrition," Jordan, p. 119, 1912:

CALORIES OF FOOD VALUE FOR TEN CENTS

	Calories
Whitefish at 18c a lb.	180
Steak, Porterhouse at 32c a lb.	347
Pot Roast at 14c a lb.	425
Ham, smoked, at 22c a lb.	759
Bacon smoked at 33c a lb.	813
Butter at 38c a lb.	948
Potatoes at \$1.00 per bu.	1867
Bread at 4c $\frac{3}{4}$ lb. loaf—5 1-3c a lb. ...	2279

At summer prices ten cents will buy the following number of calories:

Butter at 30c a lb.	1201
Butter at 25c a lb.	1442

In the winter the price of butter is at its highest figures. The rest of the year the consumers buy it at a lower price. The price is much lower in the summer. The other foods in the above table are nearly the same price the year around.

Contrary to popular opinion, butter is not the most expensive food. It is moderate in nutrients obtained for the price. Butter not only has a high nutritive value, but it also has a high flavor which increases the palatability and digestibility of foods like bread and potatoes, which would otherwise be insipid. Three hundred years ago Father Cats said: "What tastes good, nour-

ishes." Hence, butter should be compared and classed with the savory foods like meats. It is the cheapest food of that class.

Combined with bread, butter makes one of the cheapest of foods. Bread and butter is about the lowest priced order or dish in a restaurant.

The above table does not show the full nutritive value of butter because it gives only the chemical value. In actual digestion 97½ per cent of the butter is digested and other fats have a still lower digestibility. This is stated by Robert Hutchinson in his "Food and the Principles of Dietetics," p. 135:

"The ease with which butter is digested renders it of great value as a source of fat in the diet of sickness. In phthisis, diabetes and many forms of dyspepsia, patients can take a quarter of a pound of it a day without difficulty and with great advantage to nutrition. Cooked butter, on the other hand, is more apt to disagree, probably owing to the liberation of fatty acids in it by the heat employed in cooking. The absorption of butter in the intestine is very complete even when one quarter of a pound of it is taken per day, less than .5% is wasted. This is a more profitable result than would be obtained with any other form of fat and should teach us that it may be well to give butter a fair trial before having recourse to cod-liver oil or other medicinal fatty preparations.

Digestibility of fats		
	Melting Point	Percentage Unabsorbed
Butter	37d. C	2½
Bacon	48d. C	8
Mutton Fat	52d. C	10

Stearin has a melting point of 150 degrees F or 65 degrees C.

It should be borne in mind that the number of calories obtained for ten cents is as these foods are purchased. In preparing for cooking and for eating, a considerable part of most foods is discarded. The work of preparing the food, the seasoning, and the labor and fuel consumed in cooking, add that

much to the cost of those foods. The cooking shrinks many of the foods. Butter is ready to eat as purchased and incurs no further expense of preparation. Ten cents worth of butter is all food and actually furnishes the consumer 948 calories of which $97\frac{1}{2}$ per cent is digestible with ease. The digestion of a bulky food of low nutritive value consumes considerable of the food's energy in the work of digestion itself.

Other fats may substitute for butter chemically by furnishing the required number of calories, but they cannot take its place in digestibility and flavor.

Bread spread with jam becomes more nutritious and savory. Hutchinson describes as follows the possibility of such substitution:

"———To substitute for butter would require $2\frac{1}{4}$ parts of sugar or 3 lbs. of jam. It takes 5 lbs. of jam to go as far as one pound of butter.

"Fat cannot be replaced in the diet by sugar or any other carbohydrate without detriment to health, and this is especially true of young children."

"Health Through Rational Diet," by Arnold Lorand, a prominent Carlsbad Physician:

"Fat is a cosmetic in warm climates; craved in cold.

"Good fresh butter is the most savory and probably also the most easily tolerated of all fats. Its principal advantage over other kinds of fats is that its fat is not enclosed in cells but consists of free globules so that it is more easily acted upon by the digestive juices and more readily digested."

"It would be a good thing for us to adopt the custom which prevails in America of eating some butter with each meal. In the restaurants there, butter is furnished without charge, along with the other foods ordered."

He ranks butter in digestibility as follows:

Butter and goose fat
Pork fat
Beef fat
Lamb fat.

He further states that fish fat is more unpleasant than butter. Also that butter is far better than vegetable fats.

The nervous system of a young infant is the least developed of all animals. To develop it the human breast furnishes a milk richer in lecithin than the milk of any other animal. Lecithin closely resembles nerve and brain tissue. This is testified by Burow in the *Zeitschrift fuer Fysiologische Chemie* 1900 Vol. XXX, p. 495.

	Suckling of	—	Ox	Dog	Man
Weight of brain to weight of body	1	:	370	1	:30
Percentage of lecithin in protein of milk .	1.40			2.11	3.05

I calculate that the fats of the above animals contain the following percentages of lecithin in the fats:

Ox—1.4. Dog—0.16. Man—1.7.

Butterfat ranks next to human milk fat in lecithin.

Figures on the percentage of lecithin in other animals fats are scarce, and it appears that the percentage is very low or none.

The researches of McCollum of the Wisconsin Experiment Station, reveal in butter and eggs the unique power of promoting the growth of young animals, which is lacking in the majority of other fats.

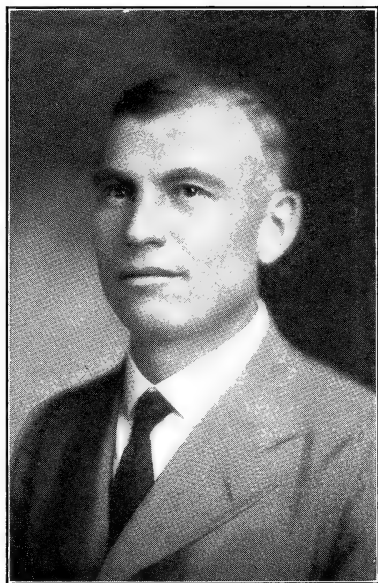
In Harper's Magazine, February 1915, is a map showing the distribution of civilization. To me the map bore a resemblance to the butter producing countries of the world. I constructed a map of the butter producing countries of the world. The countries having the highest civilization are also high butter producers. The two maps practically coincide. I cannot tell whether intelligence creates an appetite for butter or eating butter produces intelligence.

Butter is the product of milk and contains the same germs as milk. But the churning and washing of the butter eliminate the majority of germs. Furthermore butter is eaten in small quantities, a half an ounce making a portion where a four ounce glass of milk is a portion. In speaking about disease and but-

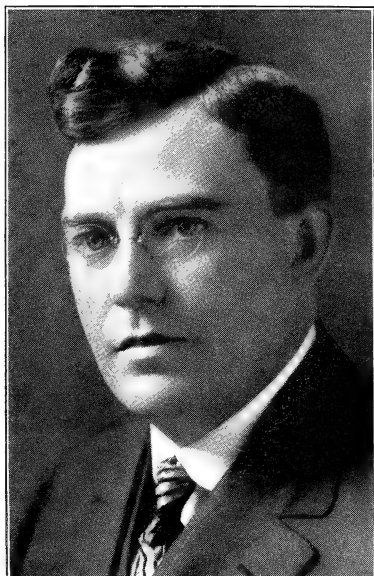
ter, some people place them in an association that makes butter appear a very dangerous food which has caused much disease. I know of no authoritative record where a disease was caused by butter. Some of the most eminent authorities state the case in substantially the same words. The producer wishes to make butter as good as possible and hopes that it will be as good as the consumer wants it to be. Pasteurization destroys all disease germs. Pasteurized butter is as free from disease danger as any other food that comes to the kitchen door. Considerable of the butter is pasteurized. If the consumer appreciates pasteurization, the producer will furnish pasteurized butter.

In summary, increasing the value of dairy products by increasing their price is not possible nor lawful. Proceeds can be increased by bringing some of the low grade products to top grade quality and by producing more in the winter, when prices are high. Profits can be increased by reducing the cost of production. The consumer will feel that he is getting more for his money if the quality is pleasing and healthful. Dairy products have been scandalized before the consumer. He should be informed of their true condition and utility.





F. W. Bouska, Bacteriologist with Beatrice Creamery Co.; Assistant to Prof. McKay; Secretary American Ass'n of Creamery Butter Manufacturers.



N. W. Hepburn, in Charge of Dairy Manufacturing, College of Agriculture, University of Illinois.

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John B. Newman, Elgin, Assistant State Food Commissioner of Illinois, and a Director of Illinois State Dairymen's Association.

CREAM GRADING.

J. B. Newman, Assistant State Food Commissioner, Illinois.

Mr. President, Ladies and Gentlemen: The Food Department, for the last three or four years has been endeavoring, and I may say—with all its might and main—to establish cream grading in our state.

It is not necessary to say why we should grade cream. We are making in this state about twenty-four million pounds of creamery butter, and about forty-six million pounds of dairy butter. If we could sell the twenty-four million pounds of creamery butter at an advance of 3 cents a pound, and we feel that where cream grading has been established, that could be done, that would give three quarters of a million dollars more to the producers. Of the forty-six million pounds of dairy butter, one-half would profit to the extent of 3 cents and the other half would profit to the extent of from 6 to 12 cents. Taking it at 6 cents we have about two and three quarters million dollars gain, and together with the profit that would be gained on the creamery butter, would make a total of close to three and one-half million dollars, if we could have graded cream in this state.

That is just the financial return to the producer. The creamery operator would share over and above this as he would find a more select or choice market for this fancy butter and the consumption of such butter would increase for, as the fellow said, "People would take to it," and it would develop a larger consumption which in turn would stimulate the trade.

I am ashamed to say that we do not hold the rank that we used to, and without any doubt,—and I say it without any hesitation—there is nobody so much to blame as the people who do not take the proper care of the cream they produced and the creameryman who does not co-operate in cream grading.

If there are any creamerymen taking the stand that they are not going to grade and are not going to pay more for good cream than they do for poor, they are no credit to the creamery

industry of the state. When you manufacture a poor grade of cream into butter, thus forcing Illinois made butter to sell at from 6 to 12 cents below the market, you are ruining the reputation of the state; you are driving people to use a substitute.

It is not a difficult problem to make cream that will bring you from 3 to 8 cents increased returns. You were told this afternoon and yesterday that the profit of the dairy farmer is that which he makes over and above the cost of maintaining his business, and if you can reduce your cost 10%, it is a saving and is all profit. Now, 3 cents is pretty close to the yearly average of 10% of the price of cream. Roughly speaking you would gain 10%, which would be a net gain, if you will co-operate in cream grading with the same success that we have had where it has been tried.

The cream grading rules that the department got out, read as follows:

Rules and Regulations Promulgated by This Department Governing the Grading of Cream.

EXTRA—Extra grade cream is sweet cream suitable for table use and such as will not curdle in hot water, tea or coffee, and free from all undesirable flavors.

FIRST GRADE—First grade cream shall consist of cream that is clean to the taste and smell, slightly sour, containing not to exceed 6-10 of 1 per cent acid and not less than 25 per cent butter fat, free from lumps, curds, dirt and all foreign matter.

SECOND GRADE—Second grade cream is cream that is too sour to grade as first grade, may have weedy or undesirable flavors or odors. All other cream shall be deemed illegal.

ILLEGAL CREAM—Illegal cream is cream that is very old, rancid, moldy or curdy, that is filthy, dirty or decomposed or is contaminated with a filthy, putrid, decomposed vegetable or animal substance, that is separated with an unclean separator or that is stored, handled or transported in unclean cans, or that has been produced, handled, separated, stored or transported in violation of the State Pure Food and Sanitary Laws. The sale, purchase or manufacture of such cream for any human food purpose is prohibited by the statutes.

Under the Food Law an article is unfit for food—If it consists in whole or in part of a filthy, decomposed or putrid, infected, tainted or rotten animal or vegetable substance or article, or any portion of an animal unfit for food, whether manufactured or not or if it is the product of a diseased animal, or one that has died otherwise than by slaughter.

The sale of such cream for food purposes is prohibited. Now, it does not cost a farmer any more money to make first grade cream. A few simple methods with good equipment will do this. You should first keep in mind that when you are handling milk and cream you are handling a human food product. You may have fed it to the hogs in the past but the great majority of it is for human food. A great many people forget that and handle it like bricks or junk. It is not right that people who are depending upon dairy products should have forced upon them poor products, resulting from your carelessness, as you like to have the laws protect you so the public is entitled to your co-operation to protect them.

Have your milkers milk with clean hands. Have them wear clean clothing. They should wash and thoroughly dry the cow's udder. They should not milk into the old fashioned open pail, but into a pail with a small but hooded opening. After milking each cow they should go to the milk house and pour the contents of the pail into the milk can. The can should not stand around the barn until it is filled or until the milking is done. It should be kept in a clean, cool milk house. The milk should be kept cool until delivered. If you are shipping cream, you should take the milk immediately to the separator and it should be separated through a clean separator. Cream should be cooled thoroughly before it is poured into the can holding the cream of previous separation. Never mix warm with cold cream. The cream cans should be in a cool and clean smelling place, and the cans of cream should be delivered frequently to the creamery. The only additional expense is the difference in cost of the hooded small open pail over the old fashioned wide open pail. Utmost care should be given to the cleaning of the utensils.

Sunshine is the best friend you have in this game. I want

to read just for a minute the results of some experiments. I think it will be of interest to you and these experiments are outlined in the weekly news letter of the U. S. Department of Agriculture in volume 316:

SUNSHINE AS A GERMICIDE.

Weekly Department of Agriculture News Letter Vol. 3, No. 16.
Tests Show That Germs of Disease Can Not Survive
When Exposed to the Sun.

Sunshine is an amazingly potent germicide for the farm housekeeper and in the dairy and stables. The practice of exposing cooking and other utensils used in connection with food to direct sunlight makes use of this fact, although comparatively few appreciate exactly the work done by the sun in this regard. Probably only those who are acquainted with tests which have actually been made realize how quickly sunshine kills disease germs exposed to it. Hence the following tests may be generally instructive and interesting.

A pasty, creamy mass of tuberculosis material, which was proved to contain uncountable numbers of virulent tubercle bacilli, was obtained from a tuberculous cow and spread in thin smooth translucent layers on sheets of glass, pieces of wood, and strips of muslin. Some of the sheets of glass, pieces of wood and strips of muslin were then placed outdoors on a moderately warm, clear, calm day where the sun could shine on them, and an equal number were placed in a dark room. After 15 minutes' exposure to the sun, the tuberculous material on the glass, wood, and muslin still contained large numbers of living, virulent tubercle bacilli, which were proved to be fully capable of causing tuberculosis but after 30 minutes exposure to the sun no living tubercle bacilli could be found; every test that could be made proved that they were all dead.

Similar tests with quite large opaque masses of tuberculosis material, larger and denser than any tuberculous person is apt to expectorate, proved that the bacilli in such masses on glass are still alive after 4, but entirely dead in less than 8 hours, and

still alive in the material on wood and muslin after 8, but dead in less than 16 hours.

The tuberculous material in thin layers on glass, wood, and muslin, kept in a dark room, was proved to contain fully virulent, living tubercle bacilli after 30 days. The contrast is remarkable, tubercle bacilli of the same kind, on the same kind of material, dying in a smaller number of minutes in the sunshine than the number of days they remained alive in a dark room.

As most varieties of disease germs are more easily destroyed by germicides than tubercle bacilli, and as tubercle bacilli, in the thin layers in which they are likely to adhere to clothing, blankets, rugs, draperies, furniture, walls, floors, etc., are killed by the rays of the sun in less than half an hour, though they remain alive in dark places a month and longer, it is reasonable to draw the following conclusions:

(a) As a general sanitary principle it is desirable that all dwellings, stables, etc., should be so constructed that an abundance of sunshine can reach their interiors.

(b) As a general protective measure against disease germs, it is an excellent practice to expose utensils for handling milk, and milk cans after they have been cleaned, to direct sunlight, and to hang or spread wearing apparel, blankets, bedding, rugs, horse blankets, etc., periodically where the sun can shine on all parts of them."

Killing the most virulent germs that milk or cream can be exposed to in from six to eight hours and sometimes in as short a time as thirty minutes; sunshine does not cost anything and when you are exposing these utensils to the sunshine you are doing yourself a benefit. We are not asking for things that cost anything when we ask you to do these things that will make a better grade of cream and it will bring you a larger financial return, put butter on a better basis, eliminate our chief substitute and competitor, and bring back to the state the reputation we used to have of which we were rightfully proud.

We have tried to have the creameries grade the cream, but they have had trouble. If they start in to grade the cream, the farmer whose cream does not come up to the grade ships it to

some other creamery that he thinks is not grading—that is not fair nor right. I am ashamed of any farmer that will do that. There is no use coming to meetings and have people talk to you and then go out and practice things of that kind. That's not right, and we ought to stand for what is right. We ought to stand for the things that are safe, the things that are going to get us somewhere as a result of all this propaganda and we bespeak of you people the co-operation that it should receive at your hands. We are going to stick to this thing. We are going to have cream grading a fact in this state and we want every creameryman to stencil his butter "Made from Graded Cream."

I was asked to gather some data and report to the Department the proportion of pasteurized butter made in this state and postal cards were sent out asking the amount of butter made from cream that was pasteurized, and I am glad to be able to report that less than 7 per cent of Illinois butter is unpasteurized and that over 93 per cent is pasturized. The actual figures are 93.18 pasteurized and 6.82 unpasteurized, and further than that the 6.82 per cent of butter unpasteurized is made in the small communities and consumed at home, and less than 1 per cent of the unpasteurized butter leaves the boundaries of Illinois. (Applause.) We are making a special effort to get the few fellows who do not pasteurize to do so, so that we will be able to say that of the entire output there is not a single pound of butter from unpasteurized milk that will leave the State of Illinois.

The creamerymen have missed their opportunity, they have not taken advantage of that fact, they did not label their butter "Made from Pasteurized Graded Cream," first or second grade as the case may be. You want to do those things. We will protect you. We are going to prosecute every farmer that offers illegal cream for sale. If you take it away from one creamery and take it to another, we will try to prosecute you to the limit of the law. This lack of co-operation on cream grading, we are serious about. It is your fault, it is not the fault of the officials, and the majority of the creamery fellows in this state have met month after month and spent their money and

have co-operated, and some lost money. Now, those fellows deserve credit and there should be more co-operation with them by the farmers who supply the cream. They should not be forced to take any man's milk or cream and be compelled to drop it down the sewer. I wish the people who make this rotten cream could be forced to eat the butter made from it.

The dairy interests have the competition of oleomargarine to meet. The consuming public will eat good oleomargarine in preference to poor creamery or dairy butter. It depends absolutely upon you producers of cream what the consuming public will do. If you make creamery butter as can be made with first grade cream, they will all eat creamery butter. If you do not, the sales of oleomargarine will be increased, and it will make a poor market for your cream, as the demand will be less for butter and result will be lower prices for your product.

We hope to have inspectors going around the state, they will be glad to help you if you only show interest in the matter. If you want to know why your cream is graded second grade, he will tell you. You can find out the difference between first and second grade cream, and there is no trouble for you to make first grade cream. Remember that the law says that cream that is run through a dirty separator is contaminated. If we come and catch you running cream through a dirty separator, it is the best kind of evidence that somebody is going to get prosecuted. If I am wrong when I say that it is not an expensive proposition I would like to be called to time about it. You can see downstairs a tank which is devised to help you keep your cream cool. Some of you in this part of the state claim that well water is not cool enough to keep the cream. I have made tests and find that with pumping a little longer you get water that is much cooler than they thought they could get. The trouble is you don't pump it long enough to find out how cool it can be.

Now, we have a bulletin on cream grading. It also refers to an extra grade of cream fit for table use and ice cream purposes, and for which you will receive a high return, that is what you want to strive for.

We ask you seriously and in all earnestness to co-operate and make a better grade of cream, it is not only for yourself, but for the community and for the reputation of the great State of Illinois.

I thank you for your kind attention.



IMPROVING THE DAIRY HERD.

**By Prof. J. A. McLean, the Quaker Oats Company,
Boston, Massachusetts.**

Ladies and Gentlemen: There is one thing that impresses a man coming from the Far East to the Middle West and taking an interest in the dairy situation, and that is, the large number of men of Danish and kindred extraction who play a prominent part in the development of the dairy industry. It brings to my mind a dear friend of mine who went hunting and coming back said "I have been out hunting." "I see you have, did you shoot anything?" "I shot my dog." "Was he mad?" "He was not too pleased." But I think in Illinois the Danish men are exceedingly well pleased with their work in connection with dairying. I do not have the assurance to think because I come from the East that I came out here as a wise man in dairying. We know you know a little about dairying, that you have a great many men here who are exceedingly capable, who have had excellent experience and it seems almost as though I were in the way, that I should come in here and sort of repeat what some of these men have been saying to you—so many things good, essential, upon which the dairy industry has been based in all the other parts of this country and the world. If I repeat things you will have to pardon me; you cannot expect me to say anything outside of what has been said here; so much that is good has been said already. Therefore I will ask you to be tolerant with me if I repeat things that have been said.

I think perhaps it is but a fair proposition that I make a statement regarding my own work here. I have been announced as formerly Professor of Dairy Husbandry from the Massachusetts Agricultural College. I know Iowa and eastern Ontario. I know Iowa as well as Massachusetts and I would hate to attempt to name any small town in Massachusetts that I have not stayed in over night in connection with my work. Beginning last October I gave up college work and joined The Quaker-

er Oats Company the idea being simply this: that the business of that company is intimately connected with the dairy business. The dairy industry will be the only cattle industry in this country practically inside of fifty years. And because our interest is absolutely tied up with the live stock industry and because to realize the development of this industry in the future we feel that every party that is interested in it, just as your bankers here, Boards of Trade and various factors feel that they must contribute, so The Quaker Oats Company have wished to take a part in the development of the live stock industry. We believe that whatever is done for the good of the dairy industry will ultimately be reflected in increased business for our company. My work is that contribution by our Company.

The dairy cow, as I stated the other day, is fast coming to occupy the center of the stage in the live stock industry, because she is the most economic producer of food for the human family. Why has she displaced the beef steer? For the simple reason that on comparing a beef animal gaining two pounds per day with a dairy cow that gives 30 pounds of milk testing 3.8—which is only an average cow—we find that the dairy cow gives six times as much protein food for man as does the beef steer. She gives as much fat as does the beef steer making two pounds per day; she gives, in addition to that about nine pounds of milk sugar for which the beef steer has no equivalent whatever, and she secretes about six times as much mineral matter in the milk that is all available for man, while the steer deposits it in his bones which goes into the fertilizer. That is why the dairy cow is coming and continues to come in addition to the many reasons given to you here.

I would like to emphasize some of the things that have been said by citing a couple of cases as to what dairying has done among my friends: In Massachusetts while the conditions are different, yet when you get down to a basis of dollars and cents, they are not very different. We get more for our milk and pay more for our feed and labor, yet you can put us on a comparative basis with you. I know a man in Massa-

chusetts who ten years ago bought a farm of about 120 acres of which 50 acres were tillable, and those were New England acres, the land sour, sharp and gravelly with practically no surface soil, six inches. He gave a \$4,000 mortgage on it; he owned five medium to poor cows and went out and got somebody to stake him to buy five more. That was ten years ago; today what has he? He has bought 60 acres to add to the 120 acres, he built a \$2,500 barn which he paid for in cash; he has gradually added to his herd and about seven years ago he went out and bought three pure bred Jersey cows. Today he has 45 head of pure bred Jerseys in his barn besides that \$2,500 barn and additional 60 acres, and of the mortgage he carries only \$2,000. His cows, if sold in the open market would be worth \$4,500. That is what the dairy cow has done for that man. I could cite case after case.

I would like to cite one other case: It is a different type. We are kind of proud of the West in the East; we sent all our good men out West to make the Middle West, all the ambitious, capable business men of New England—not all of them, but a very large per cent—came out here and that is why you are such a great country, and that is one reason why we have not progressed as fast as you.

One of these men, he's now quite an elderly gentleman and a very good friend of mine, was nineteen years old when his father died, and, for some reason or other, the farm had to be sold. He was left to shift for himself, came West and got into business. The farm had been in the family since the Revolutionary War and there was some sentiment stifled when it was sold. There was a good barn on the farm; which his father had just finished before he died. The young fellow never forgot it and wanted to go back and buy that farm with the good barn. He started about 1893, got that farm, eight cows and started to ship milk to Boston and he went on buying cows, working up his milk route until about 1900 or 1901, at that time he owned 30 cows and had quite a nice little milk trade. He then began raising his own cattle.

In 1901 or thereabouts, he had 30 cows; today he is milk-

ing 80 cows, he is raising from 25 to 30 heifer calves a year. Before he began breeding, his cows averaged 4200 pounds per cow per year, by using good sires, grading them up, his herd average now 9,000 pounds per cow per year, including heifers with their first calf, and I have seen his figures. More than that, he has a market for all the cows he will sell and he does not sell them before they freshen with their first calf. He nets one cent a quart on all his milk and he buys all his grain and he buys most of his alfalfa hay and it costs from \$22.50 to \$24.50 a ton. His whole farm is charged up against his dairy farm. He has used pure bred bulls always of the same breed for 15 years. The cheapest cost him \$150, the best over \$300.

Q. What breed did he have?

A. Guernsey.

Q. Is his living included in that?

A. His wages are included as also his son's wages.

That is what the dairy cow will do for you, and you do not need to go to Massachusetts to see that, you can do that right here I believe, although I am not familiar with your State and conditions in this vicinity. I met a nice man by the name of Johnson since I've come here. Get the figures on his herd and see what you will find. Johnson's cows pay for themselves in a year and for their feed and for the labor and for the interest on the investment, not all of them, but a large per cent.

Mr. Mason: What market does he have?

Prof. McLean: We would laugh at it in the East, we would not call it a market.

Now there is a certain condition in New England which I wish to call to your attention because I feel confident that you can learn from our mistakes. It is a very peculiar thing about this animal we call man, every generation seems to have to learn

over again the experience of the preceding generation, and men who have gone through it and can get up here and tell you, may put it earnestly enough, yet you will walk out of the door and say to yourself "It is all right for him" but still you do not act on it and you will go through the same experience, then by the time you are as old as some of these more experienced men, you will get up before the young fellow and think what a fool you were that you did not believe what you heard twenty-five years ago; you will then talk as the older men now talk—and the young men then will act as you are acting now.

We have gone through some things in Massachusetts that have been rather sad. Massachusetts has been a great dairy state; Massachusetts unfortunately has been decreasing in the number of cattle in the State during the last fifteen years approximately, gradually going down hill, and we are making mighty efforts to save our farming. What is the story? Milk has increased in value, and more and more as milk increased in value this is what happened in our dairy business. Our men, twenty-five years ago, raised the cattle for the dairy business; but later their feed was considered too valuable for anything except fresh cows so that a very large part of the dairy industry in the State of Massachusetts has become an industry of milk production. When we want some cows—we go out and buy cows and bring them in to keep up our flow of milk—we don't raise them. This has gone on until Massachusetts has become the controlling market for dairy cows and none are produced to any great extent.

Mr. Mason: Where do they get their cows?

Prof. McLean: From Ohio, East, I think they come sometimes to Chicago.

In Massachusetts we have higher-priced land, higher-priced labor, we are under Labor Union conditions practically on our farms and we have to pay more for our feed, we are under stricter surveillance, we have harder conditions making milk cost more, and still we are competing with the fellow in the outlying sections that does not have these hardships, and to add

to that we go up into Vermont and New York State and say "We haven't any cows, we want some of your milk cows." Did you ever sit in a game, any of you sporting gentlemen, and attempt to beat a man at his own game and take the discard from his hand? That is what we are doing in a dairying way in Massachusetts. Do you think we can go up into Vermont and get the best cows? We cannot now. They have got forty-two Dairy Inspection Associations in Vermont. The thing that I want to emphasize is this: That in Massachusetts they must raise their own stock; and that's one thing that I want to say to you because you are making a beginning here, you have got to go out and buy a few good cows now, but you can't continue doing so and that is the thing I want you to remember. Your farmers cannot continue to get cows up in Wisconsin and other states—they are playing the same game. If you get good cows you will have to pay a big price for them. As long as you are making milk the main part of the industry, and that has been largely what has been spoken of here, you are making the side-show the main circus. There is more money to be made in your cows as cows, don't forget that. You are going to pay from \$100 to \$125 for each cow and you are not going to get the best; you can raise them for \$50 and surely under \$60 up to the time they drop their first calf, and they will earn it for you the first year, whereas when you go out and pay from \$100 to \$125 for them, you don't get as good cows. Do not forget that these men that are making a beginning must have bulls. Insist upon them getting bulls not simply to be bred to the cows that they have bought, but to those that they have on their farm. Put a good, pure-bred Shorthorn, Holstein or other bull (they all have merit) into every herd and avoid this continual financial draft to replenish your herd to keep up the industry.

There are no seas that I know of on which there is constantly smooth sailing, and no business that does not have its drawbacks, and when you go out buying cows you sometimes buy more than you bargain for and sometimes something that you don't want. The advantage when you raise your own stock is that you are not importing anything; that is the advan-

tage in using your own bulls—you don't get such troubles as contagious abortion, or tuberculosis.

Then, too, a man who raises his own stock knows it, he likes it, has a personal interest, feeds it rather better, and when it comes to maturity he sees how much good there is in it and develops it giving it better attention and care than if he went out buying stock. That is a very important factor in the dairying proposition. A man who does not love cattle will not succeed at dairying.

Now in regard to bulls, I am emphasizing with "maillce a forethought." I am confident that using good bulls is the greatest step that you can make. You should always use a pure bred sire. What breed? It doesn't matter; only this: continue to use the same breed. We are not raising cows for the fun of it, but to make milk and sell it. Breed the same kind that your neighbor has, and the men all around you. In New England we are a stubborn people and we hate to imitate anybody. We are independent above all things, and if our neighbor buys a pure bred Holstein bull we wouldn't buy one of that breed because we would be imitating. We have suffered from that, and I can take you to many communities in New England that in a radius of five miles you can find four different pure breeds. Why? Just because they are independent. Let all breed the same breed in a community, it does not matter which breed. In the last analysis the individuality of the cow is the thing. Good cows, any breed—only work together.

You sometimes hear it said that the sire is one-half of the herd; I want to tell you that the sire is the whole herd when it comes to the improvement of the dairy cows in this country. My friend who is in the milk business near Chicago goes out and buys better cows; he can pay more money and he can get better cows than I can. Everytime he buys a good cow, I cannot get that cow; when he is improving his herd he is degrading somebody else's herd. The only way that we can improve the entire milk production of this state is by using better bulls than we have ever used before. If it is a fact that grade bulls are being used in Southern Illinois then I give it to you as members

of the Illinois Dairymen's Association that the best slogan you can adopt is "get rid of the scrub sire." There should not be a grade bull of any breed in service in any man's dairy herd and the poor man is the last man that can afford to have a poor bull.

What does it mean whether I pay \$25.00 for a bull or \$150.00? Suppose I have 18 to 20 cows. One Hundred and Fifty Dollars should buy a bull out of a cow that has made over twenty pounds of butter in seven days. On the other hand the \$25 bull won't give any improvement. I am not advocating a high-priced bull because of price alone. We may lose when we go for price alone. Nevertheless what should a man pay for a bull? Three times as much as he thinks he can possibly pay, and when you go buying a bull just remember this, you are in the dairy business for life, because you can't get away from it. It is not a question of what I am going to have next year; the man wants to carry in his mind the kind of herd he wants to have in his barn ten years from today; and he wants to pick out the bull that will bring the herd as close as he can to this ideal which is embodied in strong cows that produce lots of milk of the right kind. These are the things that you have to emphasize. Get a bull that has a large chest capacity, a large food capacity and production inheritance. The only assurance that a bull is any good is what is back of him. I have seen young, handsome bulls that I would not want in my herd unless I was in the beef-raising business. Another reason why I like to see a man pay for a bull is this: "Where a man's money is, there is his heart also." If you buy a \$25 bull you give him \$25 care but when a man buys a sire for \$150.00 or may be \$400.00 he has the best bull in the county and if a man says he has not he will have a scrap on his hands. That man will give that bull good care and incidentally he is going to take care of all his stock; he finds it pays and one of the big factors is giving the cattle a chance.

As I said the other day, you can put all the money you like into cows, but if you won't feed them you are wasting your money. The last thing that was put on any of our pure breeds

was size. Those who know the history of the Ayrshire know that less than one hundred years ago they were a puny lot, with scarcely milk enough to raise their calves. Today you go into the Ayrshire ring where you get the best type of Ayrshire cattle and you will find them great fine, animals of size, type and capacity.

Q. What do you think about the Durhams in Pennsylvania?

A. Any good milk cow is a good cow.

Let a man get a fine, big Holstein sire and fail to feed the calves, they will not develop—the influence was good, but it did not have a fair opportunity.

Just one word and I will cease. Remember that the first year of the cow's life is the most important. With the calf, the first year, the first six months, the first three months are the most important. You cannot raise calves, sell all your milk, start them out as young things without feed; winter them in the shade of a barbwire fence, feed them on corn stalks, and make good cows. Take good care of them when they are born. They often get setbacks and scours due to careless methods which means dirty feed pails, or milk that is insufficiently warm. Those two things a young calf cannot stand. The pail should be scalded with boiling water at least once a day. Don't fail to warm the milk. These two things in connection with the raising of the calf I consider the most essential things. Don't breed heifers too young; it is apt to give them a set back in their growth, and unless one is very generous with feed one stunts them as to growth and as to the real future of the calves.

Q. With mixed hay, Sorgan hay, corn and ensilage such as he made this year, what should he feed with it?

A. One of bran, one of cottonseed meal and about three parts of Schumacher Feed will give you an excellent ration.

DAIRY COW DEMONSTRATION.

By Mr. T. A. Borman.

I really consider that what I might have to say now would be superfluous.

An indictment stands against me by your worthy president as to whether he milked more cows than I did up to the age of 30, but I will talk that over with him personally.

The statement made by Mr. McLean is true as long as we live here day after day, generation after generation and we find ourselves fifty years of age and no farther ahead.

Following a talk on breeding I was asked by a man "What do you think of using Hereford bulls on Jersey cows?" Why it would be a good beef combination and would not hurt the milk any. They don't seem to think that anybody else has ever lived in this world besides themselves.

I am ashamed of the fact that I did not have an agricultural college education. One of the regrets of my life is that I have not had the opportunity in that respect that hundreds of other men have had, and the only reason that I did not have such an education was because I stuck to the cow. (Applause.)

Now, then, my information was absorbed, it came from observation, it came from books and papers, and I wonder if it's a crime. I mention that frequently to point this lesson. There is not a boy in this house, or county, or in the State of Illinois, who, if he can't or won't attend the agricultural experiment station of this state who need go without that knowledge; he can learn as much as I ever learned and the chances are he will learn ten times more, if he sets his mind to it. There is that ray of hope for the young man—he can if he will.

I was born in central Kansas and you fellows have all heard about the grasshopper days? I was born in that state. The hard times did not cease with the grasshoppers. There were devilish hard times along about 1880 when the farmer

roped a bunch of Shorthorns and was trying to milk them, and the reason he tried to milk them was because they were worth nothing for beef; he had made his living by selling heifers. It was necessary that we begin milking cows and we began. I had taken notice of some things that I saw in Hoard's Dairyman which we did and we soon began to make more money. I had an uncle in Kansas who had gone into the Holstein business and when the railroad was built through that part of the country his boys left the farm and went to work for the railroad in the division headquarters. They were established there and these Holstein cows were sold at public auction. He lived about 25 miles away and my father went down to his brother's sale and more to be a good fellow than anything else, to help this sale along, bought two Holstein heifers. They were carrying calves and freshened in the fall of the year. Those two Holstein cows gave us more milk than all the rest of the cows we milked. It opened our eyes for dairy bred stock for dairy purposes. These heifers came into milk and the value of dairy blood was indicated to us on that farm. The question immediately was of getting a pure bred bull and improving this herd of ours along the line we had read and which we believed. We found a pure bred Holstein bull which had served. It was priced to us at \$250. Let me tell you that that looked bigger on that farm than \$2,500 looked ten years later. It required some nerve to sell enough of those red cows to get that bull, but we bought him and while we were buying this fellow, the man who had him to sell, showed us a magnificent four-year-old cow, pure bred that he would like to sell for \$100; that was another jolt. So we bought this heifer, she was giving milk a little and we stopped her and later she became fresh. This cow was a magnificent specimen, I believe as fine as I have ever seen. After she freshened my father tried to milk her and he gave up the job, he said she milked too hard. My advice had been followed in buying this heifer and it was up to me to milk her and I milked her and I don't know whether she actually became easier to milk or whether my grip got stronger, or both, but we made a fortunate selection in that bull, he was worth

\$1,000 to any man's herd of ten or fifteen cows. That bull put our herd on the map. We used him as long as it was possible for us to use him. In the meantime we found that a creamery had been built way off somewhere by a Chicago outfit and following in the wake of this creamery some Holstein breeder from Illinois had sent a carload for the farmers to buy. We found out that these cows had been sold to a fellow who had mortgaged his farm and who was not a dairyman. He went busted. The cows were sold at public auction and went to the four winds. We picked up some of these cows, they were old by this time, but we used them to the bulls and we had some pretty fine heifers. Later our herd was sold. It was the saddest mistake of my life, you can take my word for that. I have seen lots more money than we saw on that farm since then, but believe me less of it has stuck in my pocket than used to stick in my pocket on the farm.

When my herd was dispersed, in 1901, they averaged 14,000 pounds of milk a year, there were twenty-five cows and they averaged 315 to 318 pounds of butterfat per cow.

These cows, only a few were registered, those which had come from Illinois were registered cows, but the transfers had not been kept and while they were pure bred their offspring were not eligible to registry. We sold heifer calves six months old whose mothers we could give records of. I believe because of those records they sold for at least 50 per cent more than they would have sold for otherwise. They sold all the way from \$75 to \$500. As I say, I mention that not because it is an extraordinary achievement, but you don't often hear that and when you do hear it you don't believe it.

Mr. Mason: "How many years was it from the time you started in until you sold out?"

Mr. Borman: "We began in 1880 and in 1887 or 1888 we introduced these Holsteins into the herd and it was in 1901 that the herd was dispersed—eleven years."

Mr. Mason: "In regard to selling whole milk, you must remember that large cities must have milk."

Mr. Borman: "However, to supply those towns it requires a different kind of dairying, a sort of specialized dairying and I have been talking from a general dairy standpoint because I believe that kind of business will generally fit more farmers.

With reference to ensilage and alfalfa and a complete feed, we have hundreds of dairymen in Kansas today making their complete winter rations of ensilage and alfalfa. I think it is a pretty fair ration, but if it was mine I would feed some corn-meal, also push this cow to the limit. You have a cow here to yourself unless you give her all the feed she can consume.

Another thing relative to this corn and cob meal. The Kansas Experiment Station state that corn and cob meal fairly ground is of equal feeding value of about equal weight of pure ground corn, but not that there is nutrition in the cob, but because it the corn and for that reason makes it more digestible.

We have thousands of farmers who have their sweet mills and a boy can grind enough on Saturday to last a week.

Kansas is the home of alfalfa. Alfalfa in silo alone, it is not worth the while. The alfalfa hay is so good outside the silo that there is no advantage in it. Alfalfa grows in this country; get it on your farm as soon as you can. With corn chop 4, 6 or 8 pounds a day is a balanced ration. It is not the cheapest ensilage. Don't feed your corn in excess of the need for it; sell it and buy corn meal.

(Reporter left the room and did not get your closing remarks.)

Q.—How about sweet clover?

A: I have had no personal experience with sweet clover; thousands of acres are used for pasture. All that I have seen is too coarse when cut to make good hay. There is quite a little waste; there are quite a lot of stems.

Q: How often did you cut alfalfa?

A: In central Kansas a yield of two tons for three cuttings will be a good yield. These are average conditions.

WEDNESDAY, JANUARY 26, 1916, 6:30 P. M.

A delicious dairy supper was prepared and served by the ladies of the domestic science department of the Southern Illinois State Normal University, in the Elk's Building, following which speeches were made as follows:

Mr. Mason: "This meeting is called to order. I want to say on behalf of the Illinois State Dairymen's Association that we appreciate the cordial welcome and reception we have received at your hands. The committee that have had this matter in charge and the citizens of Carbondale have made good on every side and we have had really in Carbondale the best meeting that the Illinois State Dairymen's Association have ever held. (Applause.)

It gives me the greatest satisfaction to introduce to you here this evening Mr. W. W. Marple of Chicago who will preside at this meeting." (Applause.)

Mr. W. W. Marple: "Ladies and gentlemen: In view of the little information that I got a half hour ago, before commencing the regular program this evening, I prepared a little toast which the Illinois State Dairymen and visitors will be more particularly interested in, which I will now read:

To the absent one, the dairymen's friend
Who travels the country from end to end;
To the man, when his day's work is done
Is one of the boys to have some fun.

To him who rides in the wagon with the band,
But who tonight is in the Southland.
Whose body is absent, but spirit is here
Whose life has been such, has nothing to fear;

To the man whose life is an open book,
Whose money was not made by hook or crook,
Who always gave an honest test—
Regardless of what was done by the rest.

So here's to "Sudy" who was glad to be able
To send the oranges that are on this table
With one accord we acknowledge we're grateful
To him who never did anything hateful.

Our message to him is one of delight,
That he can retire from most of the fight
May he enjoy the Southland's sun
Free from care till life's work is done.
(Applause.)

A very flashily dressed gentleman blew into a prominent hotel in New York City one day. He wore a big diamond, and he stepped up to a stenographer and said: "I want to write a letter to my girl." He gave her the address and said: "Tell her that I have been playing poker and made a barrel of money and that I am going to Narragansett Pier and have a time." She asked him how to spell Narragansett and he started "N-a-r" that was about as far as he could get, and finally he said, "Oh, hell, cut it out, I will go to Newport News." (Applause and laughter.)

I have been placed in my life in a good many embarrassing situations, it seems to me that I have introduced all kinds of people to audience, have acted in this capacity a number of times, but I believe this is the first time in my life that I have had the pleasure of introducing the men who are here tonight to talk to you, and this embarrassment is due to the business that they are engaged in. My association with these gentlemen,—with this class of gentlemen—has been of a private nature, it's been generally when we were alone in the back room and when some manifestation was given upon the part of them that they were sorry, etc., but they are here tonight for a different purpose.

It seems to me since my stay in Carbondale that at every corner I have seen something that the people of Carbondale have reason to be proud of and grateful for. I have enjoyed the hospitality of what is, to my mind, a wonderful hotel; we have had the hospitality of all the citizens of Carbondale; we have had the courtesy extended to us of this wonderful educational institution that you have got and we left that with a memory that will never be blotted out. To us it was a wonderful sight, a sort of inspiration. We have been favored with the most beautiful music; we have had nice places to eat; we have had conveyances to take us from one point to another. There has been nothing overlooked, nothing left undone to make the visit of those people who have come here perfect in every particular, but I want to say to you tonight as I introduce the first speaker on this program, that it seems to me, in view of the needs and necessities of this country that there is nothing that you can be more grateful for than that you have in this community men who are willing to assist in putting on its feet a wonderful enterprise that will contribute not only to the wealth of this community but to the contentment and to the happiness of the people that live here.

Mr. Grissom, I understand, is a pioneer and he has accomplished wonders in his section of the country and he comes to you tonight with a report that will make your hearts glad and will increase your confidence not only in the business, but the practicability and feasibility of getting behind it with a will. I take pleasure in introducing to you Mr. Grissom of Centralia." (Applause.)

Mr. W. M. Grissom: "Mr. Chairman, Ladies and Gentlemen: What I may say this evening reminds me of the story, because it is a repetition of what I have said a number of times in different places, and that's the story of the colored porter in a Memphis hotel. He was given to using, as is common to his tribe, all the big words that he would hear. He was asked by one of the patrons of the hotel where he might find a good restaurant and the porter replied: "I don't know, boss, the one down town is very good, but the one up town is very obituary."

The reason why I am interested in the dairy business as a business man is because I like Southern Illinois. I believe in Southern Illinois and I believe the character of its soil, the diversified agriculture that has been followed here has depleted the soil and that we need a change, and the dairy business is what we need in Southern Illinois.

I was coming down on the train this morning, talking with a good business man of Centralia, he said: "I hope to live long enough to see this soil out here like it was fifty years ago" and he said: "I believe that it can be made better than it was fifty years ago, I think it can be improved even to what it was in its virgin state."

I believe one thing truly, and that is that grain farming, successful grain farming in a general way has passed in Southern Illinois. I don't believe we can make claim to build up this fertility and maintain the farms and improve them and make them better by grain farming. I think, to begin with, it will cost too much money to buy the commercial fertilizers to be applied to bring it back to the virginal condition, and I know of no way that we can keep Southern Illinois from becoming a waste land than by the live stock business, and I know of no live stock business that is so remunerative, that is of such immense educational, uplifting value as the dairy business.

My observation has been, traveling through the best dairy sections of the country and studying the dairy situation, that the best homes, the best kept farms, the happiest families, the best schools and the best country churches are found in the dairy communities. The first consolidated school, the first state to adopt the county high school, agricultural school system, was a dairy state, and I was traveling with a gentleman today from Wisconsin and he said this: "The average farm in Wisconsin is 119 acres, the average farm in Kansas is 245 acres; the average income from the farms in Wisconsin is better than \$2300.00; the average income from the farms of Kansas is less than \$2300.00 with twice the acreage."

The homes of the dairy sections are contented, cultured, comfortable and good, in the other many of them are places.

cabins or places for herders or ranchers not the contentment, not the culture, not the spirit of home in those places.

In speaking of what dairying may mean to any section, I heard one of the best dairymen in Northern Illinois say, that had moved to Southern Illinois, that "At the time I began the dairy business, the conditions at the time being equal or as good I could have been worth considerable more money and may be much easier because you can grow more leguminous plants in Southern Illinois, and you have shorter winters and milder winters, earlier springs and later falls."

I want to repeat to you just one thing that I have studied thoroughly and that is, that I think it wholly impossible for Southern Illinois farms to be improved or even maintain with the present system of farming. My observation is that they are gradually going down, gradually producing less, that it is necessary that we change to a line of farming that will improve this condition.

My home is at Centralia, I have been there about five years. When I moved there five years ago I came from a section where it was all agricultural, everything depended upon farming, we had no manufactories, no mines, no railroad pay roll. In Centralia I found the opposite; we had there large shops, railroad shops, and a large railroad payroll; there were two mines in operation, a large payroll from the mines and this condition had caused the business men of Centralia to overlook in a measure the importance of agriculture.

I said to a banker there that I observed that there were not many farmers' names on the books of the bank, and he made the remark: "You will have to look to the business institutions of Centralia for your deposits." I did not agree with him. I realized, as you realize, that the biggest thing that we have got to look to for financial prosperity is the farm. The acres were there, but they were depleted in a way. Many of the farmers were coming in and working in the mines and on the railroads after having made just enough on the farm to feed their stock and the other necessities of life to tide them over to the next year from a farming standpoint, securing their surplus money from the mine and railroad work.

I suggested to the business men there, and I don't want to make the assertion too broad, that we get together, invite the farmers to a meeting, have the business men of the town ask them to become members of the Commercial Club and be a business man with the farmer with equal feeling and on equal footing, and at the first meeting the invitations were sent out by the secretary, the meeting was held in the basement of the Christian Church, there were over four hundred sat down to the table, a large majority of them were farmers. We had good speakers there and some of the farmers responded, and later we had another meeting like that and there was a good attendance and there is a general good feeling between Centralia business men and the farmers in the vicinity of Centralia, and as a banker I want to say that I observe one thing, I sell less drafts to Montgomery Ward & Company and Sears, Roebuck & Company than I did three years ago. Today every business man in Centralia is a booster for the farmer, and every farmer, as far as I know, is a booster for every business man in Centralia, and there is a general good feeling there.

Out of this grew the idea that to develop these farms to the best advantage, the dairy industry should be encouraged and the proposition was made to the farmers owning their farms, who were fairly successful, that the banks would loan them the money at six per cent on long time to buy good cows. The cows must be of good dairy types and dairy families and we bought Guernsey cattle, not that they are any better than the Holstein, or Jersey, but because they were already there and our idea was to develop that community along one line of breeding of the dairy type, and we have been pushing the Guernsey cattle.

An Association was organized, officers elected, and grew into a North, South, East and West groups, and it was recommended that stock be issued and that bulls be bought for each of these groups from different families so that they might be changed and save additional expense. Three of them have been purchased of as good families as we could buy, not adhering entirely to the type but to the producing qualities.

The bank that I am connected with shipped in between 80 and 100 head of cattle. We have sold them to those farmers on time at 6 per cent and they are gradually liquidating the notes given for them. These cows have been sold at actual cost and expenses.

We had the worst drouth we have had in years year before last and those cows left one of the farmers a little profit and feed the remainder of the stock. Another farmer who is present here this evening, a progressive and up-to-date man, as the one I have just referred to, bought ten heifers and ten or twelve cows, he has one of the males, so has another in another group, and I got a letter from him a few days ago and he said, in the terms of the great statesman, "I am delighted with my cows," and in that letter he enclosed a card calling his farm "The Egyptian Guernsey Farm" and he had some fine chickens advertised and other things with his letter head. I wrote back and said that I thought he was getting a little fastidious, but keep it up! He went with me last spring into Wisconsin to buy cows, and when we got up into Northern Wisconsin he was so delighted with the cows there he wrote back and said "For fine farms, fine Guernsey cattle, and beautiful milk maids, Wisconsin has the world skinned." Every man that has bought cows is well pleased.

In the last few days since we have had some sunshine I have taken a half dozen orders for cows to be purchased later. There is hardly a day that a farmer does not come into my office and ask about wanting to buy cows. The movement is started and I don't believe it can be stopped, and the observation of the business men who have had a chance to deal with these men who are milking cows claim that every indication points to the general good of the man that is milking the cows.

We expect to see the vicinity of Centralia a dairy section. We observe too that the herds are increasing and the men are asking for larger herds and handling more cows easier than they handled the few in the beginning, it is a matter of education, and we have asked the pure food commissioner to send us a man and he has volunteered to do so. It is one thing to

put the cows in the hands of the farmers, and another thing to feed them properly, and we are trying to keep them going. It is a matter of education and we feel that it is started to the extent that it is and should succeed in our vicinity. I thank you." (Applause.)

Mr. Marple: "I am thinking of a little boy who had associated so little with his mother and so much with his father that he contracted the habit of swearing, very much to the annoyance of his mother who tried to break him of it, but she did not succeed with anything that she had tried. Finally she told him that if she heard him swear any more he would have to leave home. After a few days—in the meantime he had refrained from swearing—his mother heard him swear and she said: "Johnny, I never break my promise, you will have to leave home." She packed up his little suit case because he was going away. When he got all ready, he never said a word, with all the bravery he could command he started down the street carrying the grip with his clothes in it and his mother watched him from one of the windows. He went some distance and finally sat down by the curbstone, his face down in his hands. She could not stand it any longer, so she started after him, to see if she could not discover what his intentions were. By the time she got there, a gentleman walking up the street, seeing the lad said to him: "Sonny, can you tell me where the Scotts live?" "You go to hell, I've got troubles enough of my own."

I could not introduce the next speaker any better than to relate the prayer of the boy crossing the pasture lot with his sister. "There's a mad bull," the little girl said to her brother and they both started to run, when they saw the bull getting closer and they could not escape, she said to her brother, "You will have to pray," and he said, "I don't know any prayer." She insisted as she saw the danger increasing. "I don't know anything but papa's blessing," said the lad. "Say that," she cried. "Oh, Lord, make us thankful for what we are about to receive!" (Laughter and applause.)

I take pleasure in introducing to you Mr. Crebs, banker from Carmi, Illinois. (Applause.)

Mr. John M. Crebs: "The first intimation I had that I was expected to address you this evening was when I received the program through the mail the other day and having but a day or so to think it over I have not been able to prepare a speech, but as I have three or four subjects on which I can deliver a speech, one equally as well as the other, as you will agree with me in regard to that later, I am at a loss to know which one to speak to you about tonight.

But after I got here and saw that everybody's mind is on the dairy proposition and the milk wagon, I was reminded of the conversation that I heard only one end of, over the telephone the other day. The nigger driver for a transfer man in town had gotten out into the country and his mule had balked, as it oftentimes had done evidently, and I just happened to be in the store when he came over to telephone. He called up the boss to tell him about it. After he got the number and his boss on the wire he said he was out by Bill Jones' and old Beck balked agin'. "Yes sir"—remember I only heard one end of this conversation. "Put sand in his ear.—No sir, didn't do no good—no sir.—Yes traveling man twist his tail, got him over at the drug store—he come around but he looked mighty old to me—yes, I build a fire under him and that's what I want to talk to you about—we needs another wagon." (Laughter.)

Well I am very much in hopes before we get through with this proposition on which we are all met here, we will need a lot more wagons, but not because we have burnt them.

I find it difficult, while talking to you tonight, to remember that I am not talking to farmers, but solely to those who are here tonight. We are certainly very much interested in the farmers' line, and dairying particularly and what few words I would say would be to encourage those of you who have so recently entered into the spirit so heartily of helping along the movement that Mr. Matthews, our state food commissioner, has started.

It has been my privilege to be with Mr. Matthews and associate with him in this work only recently, because of my connection on one of the committees of the Illinois Bankers' Association. Mr. Matthews asked me for assistance in this work such as I could give and it has certainly been a privilege to work with him.

I thought that the work would be short and simple and endeavored to go into it with enthusiasm, but we had not got started until we found one obstacle after another. In my own home town the experience was very much the same as Mr. Grissom's. Where we could go into a town and find people who had the money to buy cows, it was an easy matter. However, we soon found that there were a great many bankers very much interested in the proposition who were not in position to furnish the money to the farmers to buy cows. We soon decided there was not much doing until we could find a way and be able to assure the banks that we had a place that they could either borrow money or sell the notes that they took from the farmers in payment for the cows they would buy. I am delighted to say to you tonight that we have made arrangements with the Woodruff Trust and Savings Bank of Joliet, through Mr. George Woodruff, who is also a member of the Illinois Bankers' Association, and at a meeting in Chicago I outlined our plans, having talked to him before that time. We told him that we thought we could use about \$150,000.00 in the first campaign in Southern Illinois, where we expected to start this movement and we had word from him that he had decided to agree to take over from the bankers who would furnish the money to the farmers in their community notes to the amount of a quarter of a million dollars for this first campaign. (Applause.)

It appears to me that our condition is the same, only exactly opposite of the fellow who bought a piece of land with a little timber on it, it was probably 20 acres and only a small tract of timber but he thought there was enough there to pay him to buy a saw mill, and so he wrote several manufacturers, whose names he had secured in some way or other, and told

them the amount of land and the timber on it and that he was thinking of trying to save that timber, saw it into lumber and from the information he had given to tell him about the size mill he would need and what they would charge him for such a mill. He received an answer from one of the manufacturers that after careful consideration they had decided that a mill of certain number of feet per day would serve his purpose and they would sell him that outfit for \$1800.00 cash, and the fellow wrote back—"What in hell would I want with a saw mill if I had \$1800 in cash?"

Now, with all this money the bankers have to pay for the cows the farmers wish to purchase, it is only a beginning of the good this is going to be to the bankers, and I am only going to tell you the experience of one customer of mine whose progress I have had reason to observe very carefully in the last two years. A German living about two miles from my home has been a thrifty, hard worker and accumulated a little land and not all of it paid for. I don't believe in considering his account for the purpose of comparison that there was a week passed by but what there was occasion for an overdraft if other arrangements had not been made to carry him along. Up to two years ago he had never been interested in the dairy cow, but he got to milking cows and two years ago he had a herd of 15 good cows. He built a modern dairy barn in every way and within the last 18 months there has never been a day but what that man's account in the bank has had a very good balance. Just the other day he sold his wheat for \$1.25 and he was enabled to pay every cent he got for that wheat on his land. He told me in the last 18 months, with not over 18 cows in milk, and not the best by any means, that he had paid every item of expense of his farming and had been enabled to pay on his indebtedness for land every cent that he had received for crops sold, and he is just now putting in the best Holstein cows that he can find, and it is a wonderful encouragement to others in our neighborhood.

My message tonight is to suggest to you that now we are in a position to furnish the money to pay for all the cows that

Mr. Matthews' department can teach the farmers how to use profitably. I thank you." (Applause.)

Mr. Ferdinand Kohl, Centralia: "For 35 years I have played the game which, for want of a better name, is called business. I have tried to play it hard and fair, and the longer I stay at it, the better I like it. I can truthfully say that it is much more fascinating than a game of chess and much safer than a game of cards.

My field of activity has always been in the office and I did not take time, like many others are now doing to take a look into the other world of nature. However, I thank our mutual friend, Pure Food Commissioner Matthews for one day coming into my office and talking to me about a phase of life which was entirely new to me; and as I listened I became more and more interested in what he had to say. He showed the way, indirectly, how I could add a new pleasure to my life, in other words, he caused me to become interested in the cow and her surroundings. He told me among many other things, how every herd could be made a factory, and each individual cow a machine of efficiency and a reliable daily revenue producer, and I am convinced that it is true that the cow can be made a sustainer and not a boarder like many of the cows now are in Southern Illinois.

As a boy I had to take care of a cow, and I, therefore, know a little of what can be expected from a good cow and I can see if one becomes interested in the cow, how she can help to sweeten, broaden, and make happier our days by watching her development.

My notion, Mr. Business Man,—and by that I mean banker, professional men, and others—she can help turn some of our thoughts to that other world of Nature which is so new to you and to me. This peaceful and contented good world of Nature that so few of us know anything about and understand less.

Have you ever noticed how soothing it is to go into the field and get acquainted with flowers, the many beautiful birds, listening to the ripple of the brook, and watch the contented

animals? The farmer who does not get next to nature and embrace these subtle influences is losing much in life that is sweet and worth while living for; and if he overlooks making the surroundings of his home more congenial and interesting and worth living for, how can he expect his wife and children to be contented?

To the hustling business man, that fellow who is in the wild, mad rush of business, trying to make money by fair and sometimes foul means, even by taking advantage of his competitor, this thought of nature must come like a cooling breeze on the hot air of our every day working life, and thus must cast a good ray of sunshine which most of us have not learned to understand.

The farmer naturally believes that his vocation is the hardest in life. While it is true he must fight the elements, yet the Bible has given us an undeniable history of over six thousand years, and has proven that this old mother earth has for all these years been a bountiful provider and has taken care of her children who live upon this earth; but has helped those most who are willing to embrace and work out the opportunities offered by her. It has always been so, and always will remain so.

We must, therefore, arise and wake up and must embrace those opportunities as they are presented to us. Never in the history of the world have so many earnest thinking men tackled so many problems which go to add to the comforts of life and make it worth living for. Our National and State governments are especially spending much money to help solve many of the problems of the farmer.

Only of late years we have learned that the dairy has been so utterly neglected, particularly in Southern Illinois,—in fact the entire State of Illinois has been a laggard in this respect. We have only to look at what has been done in the State of Wisconsin, New York and see how some of our other States are forging ahead. We used to have our County Fairs and nice cattle were displayed, but we never thought then of showing a cow that could almost produce her weight yearly in butter fat and could give enough milk to drown her in; and yet that very thing

is going on under our eyes. If you are a reader of any of the high-grade dairy papers you must have noticed how with such wonderful rapidity butter and milk records are being broken. New ones are made only to be smashed a few days later by records still more astounding. They come so quick and fast that they almost take our breath away. Back of these records stand the trained stock breeder, the food expert who knows how to blend and balance the food so that it gives the correct ration, and with them comes the co-operation of the scientific farmer who is willing to embrace these discoveries as they are brought forth, so that many stories we hear sound very much like an Arabian Night story of men who have accumulated wealth in this line, and cows that seem to have the touch of old King Midas for making money. Am I right in this, you gentlemen who know?

Many of the men that you are listening to at this meeting are self-sacrificing men. They are willing to help you, and yet not for the money that is in it for themselves, but for the good of the cause; and they are making reputations for themselves which will last long after they have passed away.

It is a pleasure for me to know that I am connected with a bank which is willing to co-operate and to help the farmers who are willing to enter into the problem thoroughly. The farmer must not think that he can buy these high grade cows and turn them loose, and let them take care of themselves for that is a big mistake.

In order to get more thoroughly informed on this subject, a few of my associates and myself have bought the poorest 80-acre farm in Centralia Township. We are now endeavoring by scientific farming to bring it up to the point where this farm will sustain the herd of Guernsey cattle which we brought in from Wisconsin. We are going to attempt to raise alfalfa and barley, and will put much of our land to Sudan grass.

The first thing that we bought was a manure spreader. All of the droppings not only of the cattle but of the 30 mules that we are working at the coal mine are being systematically spread upon this land. A crushed lime stone spreader was also pur-

chased, and the lime stone has been spread according to the teachings of Dr. Hopkins, and we will follow the lime with phosphate rock. A modern barn—not expensive—was built according to government plans furnished free. This barn at this time is being used for all purposes, but next summer it is our intention to build a loafing shed for the cattle and they will only go to the present barn when they are being milked. A modern tile silo has also been built, and it has been filled with ensilage taken from the farm, which only a year ago was so very poor.

Now in order to go at this thing properly, we found it takes capital, which the banker is willing to help you get, provided you show him that you are in earnest in this matter.

A milk house has since been built and a 3-horse power engine and boiler have been installed. A cream separator has been purchased. Milk testers and milk scales have been purchased. A large wagon scale has been purchased, and it is the intention of having everything going in and out of the barn weighed. We are trying to get this proposition on to a basis where we know just what it will do, and not work by the rule of thumbs.

Now the average farmer perhaps may not care to spend quite as much money as we have, but some one must take the lead, and we are simply trying to prove that the dairy interests will pay on a fair investment of money if it is conducted on business lines. We are trying to show that cows can be made revenue producers and must not be boarders.

This is a most interesting and fascinating study, but there are men here who are so much more capable to tell the story than I can, but I do want to say before I close that I hope to live long enough to see creameries and cheese factories dotted all over this state. There is big money in cheese and I hope that there will be some one at this meeting to tell us more about it.

And now in closing, I want to say that the future of Illinois, to my notion, lies in promoting the dairy interests. I have lived here all my life. My interests take me all over the United States, and ever since I have become interested in this movement I never fail to inquire just what the dairy interests are

doing, and invariably I find that where it is most highly developed, there it becomes the most profitable.

If there are any bankers in this audience who do not feel like co-operating with their farmer customers, my advice to them is to get busy, get wise, and get into the band wagon. If you don't, your competitor will, and you will be a trailer and will not be helping a movement which is now so thoroughly recognized as a necessity.



HON. W. SCOTT MATTHEWS, PURE FOOD COMMISSIONER.

Mr. Chairman, Ladies and Gentlemen, and Friends:

I thank you very much for this opportunity, and it would not be in good taste on my part to inflict a talk on you, or attempt to do so. I feel, however, that I want to thank the people of Carbondale for their continued faith, friendship and loyalty to me, and the favorable comments on my work, but there is one thought that comes to me here, and that is, if I have accomplished anything it has been due to the opportunity offered me by the loyal friendship toward me by the people of Carbondale and Jackson County who have stood by me and behind me in securing this appointment. Whatever I may be able to accomplish and what I have accomplished I want you folks to know that I first feel the obligations that I owe to you here in Jackson County, and while I am here, as this is my home, I take the time because I think you will be glad to know it, and tell you that I recently made a comparison of my work compared with my predecessor's in a financial way—what I have accomplished in the Food and Dairy work must speak for itself—that, we have not the figures on, we must take that for what it is worth, but in a financial way I am able to give you facts and figures. I have taken the two and a half years, the best years of my predecessor's work, under the same laws and practically the same conditions, and my two years and a half work and I am very glad to tell you that receipts under my administration has exceeded that of my predecessor over \$50,000.00, and while it is blowing my own horn, it is my horn and I don't know of any better place to blow it than before the people who have helped me."

THURSDAY, 10:00 A. M.

Mr. Mason: "The meeting will please come to order now. I will appoint on the Nominating Committee the following gentlemen:

Mr. John Nelson, of Peoria.

Mr. Elmer Mack, Springfield, and

Mr. H. G. Easterly, of Carbondale.

The first speaker is a practical Southern Illinois dairyman and he will discuss his subject according to Southern Illinois conditions, and I take pleasure in introducing to you Mr. Irish, of Farina."

THE DAIRY BARN.

H. P. Irish, Farina.

Mr. President, Ladies and Gentlemen:

I do not come before you today as a regular speaker, I am a hard-handed farmer from Southern Illinois, and I know what it means to handle cattle in many ways as we are in Southern Illinois. I am not here today to speak to you on the modern barn, I am here to speak to the average farmers of Southern Illinois, not these gentlemen visiting here that know more about it than I do. We are not ready today as a general thing for \$10,000 barns or \$500 cows.

We have heard a great deal about dairying. The farmers need developing just as much as cows,—you have got to grow. Grow into this dairy business. I have known several men in Southern Illinois that saw the checks of practical men that came back from the creamery, and they wanted to get into the game; they jumped in and could not make good. The average farmer

must grow into it. Mr. Mason could go in on a \$100,000 plan and make a success of it, because he has had years and years of experience, and his ancestors were dairymen, I believe.

I will go back a little bit and start from the beginning and show some of the laws and principles that are behind this subject of barn protection for dairy cattle, why it is absolutely necessary.

We were told yesterday by Professor McLean that *Breeding*, *Feeding* and *Weeding* out were the three principal things in the dairy business,—I want to add another, and that is *Protection*.

You all know that the barns in this section of the state are not what they should be in every respect. As I came down on the train I noticed particularly in reference to barns that I could see from the car window. Do you know, I hardly saw a window in a barn between Fayette County and Carbondale.

With all due respects to doctors, the three greatest curative agents are sunshine, pure air, and pure water—they are the three great curative agents, and that is what we want in the dairy. When the great Creator set this world in motion, He made some fundamental laws, very few laws were made, but they are infinite in their application, and hold good from the lowest plant to the highest animal.

The first law I will speak of is the law of development. My mother remembers when the tomato was considered a poisonous plant, afterwards they were called "love apples," and now see what use is made of the tomato. I am only using the tomato as an illustration of this principle of development. It is just the same with the cow. We saw there hundreds of young men and women at the University being trained. It is the only way, and when we develop in any direction we have got to put forth every effort within our power to hold it up there after it is once developed. You let the conditions that have brought your boys and girls, men and women, to the present state of civilization, let it go for a few years, and where are you? We revert. It is true all the way through.

With another law, the law of Compensation, Emerson

says, that we make no advancement without giving up something else. We have got to give up something to make advancement in something else.

Take the cow, when she was created she gave just milk enough to supply her calf; she was not a beef animal nor a dairy animal, but a wild animal. Through all generations she has developed to what we have now. I think in India they have been developed into carriage animals. But in the dairy cow we see the wonderful, almost unbelievable progress that has been made in that direction, but it can never be held there unless the environment is right for that cow, and we watch out for the breeding, feeding, weeding and protection of the dairy cow.

Now, the barns of Southern Illinois are certainly not a credit to us farmers. Any of you gentlemen who have money deposited in the bank, or if you go to your local bank and deposit your money, would you go to a bank where you knew it would be wasted? The barn is the farmer's bank,—it has been called so by other people, for there the farmer deposits his crops, stock and some of his tools, and most of all, perhaps, his labor. Now, those barns, many of them, have cracks up and down the side. You would not deposit your money in a bank in that condition, would you? The dairy cow's present development cannot stand that. It is a grand thing that these business men are furnishing money for the farmers to buy cows, but you will need that or some other money in protecting and caring for the cows for they will not be a success until they are cared for properly.

The Indians could live through the worst blizzard out in their tent; I never heard of any freezing to death. Could you and I take our families into a tent under like conditions, and live? You turn the dairy cow out into the cold winds, as cows are treated in this southern country, and she cannot be a dairy cow. That is just a little illustration.

A few years ago, along in March, the sun was shining brightly and the south side of the barn seemed the most pleasant place on the farm, I turned my cows out. I always test the milk and keep an accurate record, and when I turned those

cows out those dry, pleasant days, when the mud was not very deep, every single time the milk fell down. Now, under those conditions even, the cows shrunk on the milk. Tell me how a cow can make milk when she is turned out all winter—why she will get right down. If you are going to get these dairy cows, put them in a comfortable place; there is no other way.

When this barn was built (showing chart) it was built by a man who had no idea whatever of dairying. It is exactly the same as it was when he built it; he thought he would have a few cows and put the stables here (indicating). A man has got ahold of it now that has good cows; he is my next neighbor and his father wanted to be a stock man and never succeeded, and the boys all of them had to milk the old cow. The boys, each one, tried to throw it over on the other. This fellow, after he was on the farm by himself, married and settled there, saw my milk checks, saw how I was feeding. I let him use my binder and finally he wanted to make good in the dairy business. He got some pretty good cows and then built a silo, and as his cows increased he wanted more barn space. He put a floor on this part of the barn and put in stanchions. Here is a manger where he put his big stock. That man today is the second in the production of milk in our community; he has learned to like the cow. That man now has developed until he has got a good herd of cattle, but he has not fixed his barn quite as that should be; he has no windows on the south side. When you fix over your windows, think how many windows you need—you really need that many windows. Sunlight you know is a grand thing. Mr. Newman told us the effect of sunshine on bacteria.

Do you know of a barn in Southern Illinois that does not freeze in the winter? Down here where we think we don't need protection, we let them freeze. As I said, dairy cows must have protection and care.

This is my barn and it is drawn on a small scale. This part here is the new part of the barn, 36x48 with an 18 foot pitch. The original barn was right here. Afterwards we built a barn right in here, 20x30, that is supposed to be the horse barn. Here is a 6 ft. alley. I am showing this because it has been made over

and over. We made a mistake in starting the roof and went up on the rafters over this 30 ft. barn and should have gone up 5 or 6 feet. Some people think it is more economic to build two shed barns, one for the cattle and one for the hay and make it more convenient to handle, but I am from Missouri, and I must be shown.

I put on 24 ft. more, so at this point here I have nearly 6 ft.

Mr. Mason: What is your siding on the outside?

Mr. Irish: If you people have got to re-cover your barn, nail down the old siding; if there are any holes patch them, then cover on the outside of that with either the best grade of building paper, or low grade of this roofing paper, up to a little bit above the loft floor, then put on your outside siding and then you have got a good siding.

Here we have now the last part where we have put on an addition. We have put on so many additions that I told my boy to go to work and build a barn to the addition, so they built this barn 36x48 and carried it over this part here so as to make more room above and come up to the end of this 30 ft. barn. Then we laid off our barn to the best advantage we could. We have a place to throw down fodder from above. This is where we put the cows in when we feed them and we give them feed and ensilage. Grind your grain fine. Somebody asked Mr. Mason if he ground the feed he gave his cows. Grind it so fine you can't see it at all and instead of putting one sack full I put in two.

If we had been building from the start we would not have placed our silo where it is. Our cows run loose all day, except at milking time. Here we have a calf pen.

Question: When you milk the cows, do you get the same one in regularly?

Answer: Yes, sir.

Question: Do you use straw for bedding?

Answer: Yes, sir.

Question: How do you like sawdust?

Answer: I don't know. It makes good bedding but not a good manure.

This kind of space is wonderfully good for the cows. Use enough bedding so that it will be clean. Here's the water from the outside; it goes underground and connects up here.

If I was to build again, I would build differently. I would build the walls of cement or cement blocks. I would put my milking stanchions by themselves in a shed and not in the barn.

I want to leave three words with you; keep them in mind: First, "Protection." Second, Sunlight. Third, Convenience.

Question: I have had trouble with rheumatism among the cows on account of dampness in the concrete walls.

Answer: It is due to lack of ventilation.



DAIRY FARMING.

T. A. Borman.

Ladies and Gentlemen:

It is too bad that courtesy, and nothing else, should result in cutting short the talk of such a man as this to whom you have just listened. There is a gentleman with a dairy instinct which must be possessed by any successful dairyman. It is true that many dairymen are born, and many are made, but those that are made must develop in themselves the feeling, the appreciation of natural and real principles as exemplified by the gentlemen to whom you have just listened. There is not a thing in connection with this dairy business in good practice for which there is not a good and sufficient reason and that runs right back to natural causes. If we ask a school boy when the cow gives the most milk and he will answer you: "In the summertime," and when you ask him why he will tell you that it is because the cow has pasture grass which is the natural feed of the cow. A good rule in the winter is to maintain that summer feed as much as possible, and that is one reason for providing your ensilage. So we might go on and enumerate these various reasons showing wherein there is a natural application of some principle of nature in the handling of the dairy cow in every one of her phases.

This subject "Dairy Farming" is a very big subject. First—The Dairy farm as a farm, next The Dairy Herd, and lastly The Young Stock. We cannot combine those three talks into one except by hitting the high places in each.

I was very much interested in listening to the bankers last night urge the farmers to buy cows. I have heard the same thing before, but was not impressed like I was last night. However, the purchase of a few cows and placing of those upon the farm does not by any means set a man up in profitable dairy-

ing. The development of the dairy farm is an evolution. The highest degree of profitableness and satisfaction which comes from the dairy farm is also an evolution which cannot be reached the first, second, third or fourth year. When you set about to establish a dairy farm you are in fact establishing a factory, an enterprise, just as the man who engages in the manufacture of any article. He does not expect to reach the ultimate success the first or second or third year, he looks into the future to build up a business which he trusts his sons will like and that they will perpetuate, and when he lays down the reins of the management that they will have a business that they can carry on. Unless the dairyman takes that view of his new enterprise, the chances are that he will not succeed. It is not a year in and year out business—you cannot be in the dairy business on a profitable basis one year when the crops are poor, and when the rains come and the sunshine and the year looks good go into crop farming, and repeat with the dairy business. This dairy business is a thing that we should look into with a view of organizing a well-balanced farm operation. There are two kinds of dairy farms the exclusive kind on which all the cows are kept and where the farm, the whole enterprise hinges around these cows and the crops grown are used to feed them and everything else is lost sight of, requiring, if successful, a highly specialized kind of dairying.

It is the other kind of dairying of which I will speak and which is the most practicable to farmers in Southern Illinois and farther west. So we must frame up a scheme of well-balanced farming with the dairy herd as the center in such a way that you will distribute the labor throughout the season. There is many a man, particularly on the farms farther west, with whom it is a matter of hiring a lot of help during the busy season and after that discharging the help and the work is done by the farmer and his family and when the spring comes the need for additional help is on again and we cannot get it. This is avoided by the business men just as much as possible. We must frame up in my judgment on this dairy farm, a scheme,

involving all of these points. I think that on most dairy farms, particularly those of from 160 to 175 acres that there is still a place for farm market grain crops. As the land increases in fertility it is not at all probable that the farmer will be able to milk as many cows as he will be able to grow feed therefor, so there in this scheme, immediately presents itself the proposition of looking into the future and determining upon market crops. Those for which there is a demand and which fit in with this scheme, and he that has the well-balanced farm is the man who makes the most money out of it. The increase is also an important point in this dairy business.

I have always held this rule, that a man is always warranted in keeping all of the cows that he and his family can milk; that rule can be applied to nine out of every ten farms. A man in our country is safe in figuring upon his own family as milkers—he cannot depend upon hired help for milking. I am speaking about the general farm. The farm will support all the cows that the farmer and his family can milk.

Speaking at the university this morning I stated that I think it is a matter in which the women of the farm, if help is short can consistently take a hand. A large percentage of the milking is done by women of the country. Many of them are compelled to milk in a place not fit. That is sheer carelessness. Expensive stabling need not be required to provide a clean milking place. A man with ten cows will be able to sell two of the poorest milkers and with his ingenuity and gumption can construct for the remaining eight cows a clean, decent, comfortable, satisfactory milking place.

I am satisfied that that can be done; I have seen it done so that if we are going to employ the women milkers in connection with this milking business, we must give them a place in which to milk that will not offend their senses, and when we have a place that can be easily kept clean, the matter of producing clean cream is easily solved. If the milking place is clean, the family will enjoy it as compared with doing other work outside. It has been the happy moment at the close of a day's work when coming out of a field in the early spring season, to

get in out of that field, get into a reasonably warm barn that was well ventilated and clean and spend an hour milking.

Until a fellow begins to feel an interest in a cow and his young stock to the extent that he finds actual satisfaction in whether or not this cow will give tonight one pound more milk than she did the night before, he will not reach to ultimate success in milking cows.

The kind of cow, I am not going to discuss for I am scheduled for a talk on the Dairy Cow Demonstration this afternoon. This will not be a cow judging proposition. I will, however, explain some of the wherefores of the dairy types.

This matter of the care of cows has been amply elaborated upon by the preceding speaker. Care in stabling of cows is very important.

The average cows of our country as milk cows are nowhere nearly as poor as we believe. The average cow of the present day is not given a chance, we fill her belly full of corn stalks and we think she ought to give milk, and she has not a thing in the world with which to make milk.

Just a word with reference to the development of this herd, that also is a matter of evolution. The speaker said that you cannot buy yourself into the dairy business. That is absolutely true. I knew a man who sold two carloads of beef cattle who had received a conviction that he wanted to get into the dairy business and he bought dairy cows without reference to prices. The object was to get as many high class pure bred Holstein cows as the money for the steers would buy. He would not listen to anybody's advice and never in all your life could you find a more miserable failure than that man made.

It occurs to me that to the farmers of this county, with the class of cattle introduced into the country and with such real aid towards a most excellent beginning in this dairy business, those cows at the price, are, in my judgment, satisfactory for beginning in the dairy business. Whether or not these fellows fulfill the hope on which they have set their mind will depend upon the way they tend those cows, weeding out the poor ones, saving the heifer calves, etc.



Commissioner W. Scott Matthews of the Illinois Food and Dairy Department, fraternized with the farmers and spent most of the day talking "cow" with them, and in advancing arguments why the dairy extension movement will result in prosperity for Southern Illinois.

PROPERTY OF HANCOCK COUNTY

A dairy cow is made to a very great extent from the time of birth until she freshens the first time. In the vicinity of Elgin most of the Holstein cows I saw there are undersized to a western man. I was disappointed. I talked with farmers over there and I have reached the conclusion that this undersized cow is due to lack of skim milk to feed it. You can't develop good dairy cattle under that system. Skim milk is just as necessary to the heifer to develop it as the whole milk is for the first few days of the calf's life. The making of the dairy cow begins with the calf when it takes its first meal and ever afterwards as long as she is milked.

The market for the dairy products for this farm. I have oftentimes stated, gentlemen, that I don't believe there is a man in the world who has milked more pounds of milk up to the time he was thirty years of age as myself, and I still stand on that proposition. This scheme of balanced farming is the result of my own experience and my own observation. There has not been a recent success as a community enterprise in dairying in this United States which I have not seen and studied from the viewpoint of this talk. If I were engaging tomorrow in the dairy business, there is only one kind of dairy product I would sell from my farm and that would be cream. Somebody must support the condenseries and whole milk must be had, but the other fellow would do it. I make this statement on my own experience; I have yet to see a well-balanced, highly profitable, organized dairy farm from which whole milk is sold and on which there is no return either in the shape of skim milk or whey to the farmer, and that observation has been pretty wide. When you get to selling whole milk from the farm you don't find well balanced dairy farming operations, speaking generally and as a community enterprise, and when we talk about the profits of the dairy we must consider that the sale of butterfat from the cows is in fact a small part of the income source. The man who has the gumption in developing dairy cows will develop dairy heifers and sell them to an ever increasing demand at a profit.

Ever since I have been in this town, I have been talking against time. Mr. Newman gave cream producers who were

in this audience a straightforward talk on the care of cream. Mr. Marple, who sat by me seems to think this talk was incomplete, that Mr. Newman had failed to make himself as clear as he should have done how first class cream, which is clean cream is produced.

Clean milking is not a difficult thing if you have this convenient and clean milking place. The stanchions and cement feeding troughs which you find in this building is the first equipment, but the drawback is that there are lots of people who have not the money with which to purchase them. I will build stanchions for ten cows that will answer the same purpose and put in a floor at \$1.00 per cow, not counting my labor. It can be put in and when your cows will be clean, a clean milk will be possible. Run the milk through a clean separator, so we must have clean separators and clean utensils, applying to pails and cans, etc. The next proposition is that of getting the animal heat out of the cream just as soon as possible. If the can is set in water and given a stir or two, up and down motion, at an interval of a few minutes it is the best way. There are many men who put cream in the cellar and put a clean cloth over the top and think it is all right, but it is better to put it in cool water and stir it occasionally. Then do not mix that cream with the cream of the previous day until it has thoroughly cooled, then it will be all right. When you milk, leave it cool for twelve hours. When the cream is mixed give that a stir. Then the place in which this supply can is held, let it be a clean, sweet-smelling place at a temperature of well water. On nine out of ten farms there is well water of a temperature that will hold this cream in a very satisfactory condition for delivery every two or three days, but again in this matter of making arrangements for cream cooling the gumption of the man who is at the head of the concern is the thing. Do the best you know how.

MARKET FOR DAIRY PRODUCTS.

By E. K. Slater, LaGrange.

Whether it be the farmer who has the raw material to sell or the factory with the finished product to sell, the marketing problem is most important.

The success of the business depends largely upon not only having a regular outlet but a remunerative market. In the case of the farmer who sells milk or cream from his dairy the cost of production represents a large percentage of the income from the sale of his product. In the case of the manufacturer who buys the farmer's milk or cream, the value of the raw material plus the cost of manufacture, represents a large percentage of the income from the sale of the product.

It is not my purpose to attempt to cover the whole question of marketing of dairy products. In a brief way I shall try to emphasize just two points, namely, what the farmer owes himself in disposing of his dairy products and the duty of the manufacturer who buys the farmer's raw material.

Every farmer owes it to himself and his family to study markets for his produce. In selling the product of their dairies too many farmers follow the lines of least resistance. They patronize whatever market is most convenient to them without giving thought to the question of whether they are getting as much actual cash as they might get.

The cost of producing the raw material remains the same no matter what market the farmer may patronize. When any product of the farm is ready for market the cost of production has been fixed. There is no changing that. The profit that is to come out of the production is the difference between the cost of producing it and whatever it sells for. The cost of producing the raw material remains the same no matter what market the farmer may patronize and the difference in cash between a poor market and a good one is all clear profit to the farmer.

Many times it represents all the profit there is in the business, for him. It is mighty poor business to work hard in producing a certain article on the farm at the lowest cost possible and then sell it at a lower price than one can get for it in order to be satisfied with less than the very highest price the market will return him for any product he has to turn off the farm.

There are many ways in which the farmer may dispose of his dairy products and the way that will return him the most money depends upon conditions both on his farm where he is in control of conditions and off the farm where he does not control conditions.

He can make dairy butter, sell whole milk, sell sweet cream for ice cream making, or he can sell his cream to some creamery. He can make a study of these different markets and in deciding upon the one he shall patronize he should take into consideration his farm conditions and his plans for the future.

The farmer who has a sufficient number of cows and lives near a large city can generally find a market for milk which will pay him more ready cash than any other market. He must, however, be content to give his whole attention to feeding and milking cows. He cannot raise very much young stock because he of course does not have his skim milk for feeding purposes.

As a rule, such a farmer is not what might be termed a good dairyman. He is a buyer and seller of ordinary cows. He is looking for high producers and is content to get a few years' service out of these heavy producers and then get rid of them. Producing milk for city consumption is not a business that tends to develop the kind of dairymen that are the backbone of the dairy industry, although of course, they fill an important place in the social life of the community.

Comparatively few farmers are located so as to make a business success of making butter and selling it. Those who do have the necessary home conveniences and who are expert buttermakers can usually find a special market for their butter at a remunerative price. They must not, however, put a very high value on their time.

In spite of the fact that the creamery business has devel-

oped until there are somewhere near 10,000 creameries in the United States, we are told that about one-half of the butter made in this country is made in the farm home. Of course a large percentage of this dairy butter does not get on the market. A large part of it is consumed in the home where it is made.

There is still too much poor butter made in this country and sold at the grocery store. Its quality is generally poor and before it can be consumed it must go to a renovating factory and be made over. The process and renovating butter factories stand as monuments to the short-sightedness of a certain class of cream producers who might patronize one good creamery because very few farmers live where they cannot reach a good creamery.

Unless a farmer is situated so that he can make dairy butter of fine quality and get a special market for it he should not attempt to dispose of his dairy products via the home butter making route. Even where conditions are right for home buttermaking it often happens that the good housewife is burdened with this chore of buttermaking because of her patience rather than from choice.

In order that the farmer may decide upon the best market for his dairy products he must consider all phases of the question. He must figure the cost of production which includes pay for his time as well as feed and investment. He should, when he decides upon the right market, stick to it and make dairying one of the strongest features of his diversified farming operations. Just as in making a success with other lines of farm work, he must look after the little things.

No greater truth was ever spoken than "look after the cents and the dollars will take care of themselves." According to government statistics there are 20,737,000 cows in the United States. Figuring that each cow produces 150 pounds of butter fat in a year, these cows produce 3, 110, 550,000 pounds of butterfat annually.

If in the marketing of this product the owners of these cows were to receive an additional 1c per pound by patronizing the right kind of a market they would receive \$31,105,500.00

more money than they would receive patronizing a market which pays them 1c less. This sum would pay for 1914 quarter sections of improved farms at \$100.00 an acre and leave plenty of money to buy horses, machinery and seed grain to run them.

Of course the greater percentage of dairy farmers in this country do not run the dairy business on a scientific basis. It is hardly to be expected that the time will come when a very large percentage will operate their dairies on such a basis. Dairy farming may be made a business success without very much scientific management. It must have common sense business management, however, and the marketing end of the farmer's problem especially means the application of good, common sense.

The dairy business in any community will develop just in proportion to the satisfaction the farmer feels in keeping and milking cows. There is very little sentiment in the dairy business with the average farmer. He is out to get all the cash he can and I do not blame him a bit. When he gets good results for his labor and investment he is going to become more interested in the business and this holds true in all lines of his farm work. If he is to be encouraged in the production of more dairy products and better dairy products he must see more money in the business.

I would be remiss in my duty in handling this subject of cream markets if I did not mention the question of quality. No matter what market the farmer patronizes he must give attention to the question of quality. I believe this will be true in the future more than it has been in the past. Consumers of dairy products are becoming educated to the fact that they have a right to demand quality as well as quantity for the price they are paying for dairy products.

One of the first statements I heard upon entering the Minnesota Dairy School some 18 years ago was that "it takes good milk to make good butter." This rule still holds good in buttermaking except that the word milk has been superseded by the word cream. It not only takes good cream to make good

butter but it takes good cream to make good ice cream and it takes good milk to make good cheese.

Inventors have for years been inventing machinery to improve the dairy products in this country but no one has yet devised a way for entirely overcoming poor quality in the raw material. As time goes on there will be more and more encouragement for the producers who put a superior product upon the market. The trend of the times is in that direction.

While there are various ways in which the dairy farmer may dispose of the product of his dairy, the fact remains that the largest part of our farmers are selling cream for buttermaking purposes. The farmer who is patronizing a good creamery may be assured that his market will not be denied him providing he sells good cream. There will always be a good demand for good, wholesome butter at a price high enough to insure a profit to the farmer providing his cost of production is right.

I now come to the question of the buyer's responsibility. The business man in the city who buys the farmer's produce has a great obligation to fulfill. The farmer is encouraged to produce more and better products when he is paid a better price for his labor and investment. The man or the men in the city who seek to create conditions so that they can get the farmer's product at less than an honest price are bad citizens. They are not only dishonest but they discourage the production of goods which the consumer needs to eat and they make it impossible for the farmer to make a profit.

There are still others who likewise discourage the farmer in the production of farm products through expensive handling of these products. They are not dishonest. They pay all they possibly can to the farmer but the net returns to him are not what they ought to be. Money that should go into the pockets of the farmer is paid out in unnecessary expenses.

The man who buys the farmer's produce and pays him an honest price is promoting the best interests of everybody. The farmer has confidence in such a man and invests his money in the production of more and better goods for such a market. Honest markets are absolutely necessary for the promotion of

any and all branches of agriculture. It is the duty of every man interested in the best interests of agriculture—be he farmer, manufacturer or educational man—to encourage and support honest markets—markets that are fundamentally correct and not those markets that are purposely manipulated or loaded down with expensive frills. It is not possible for the dairy business to prosper unless farmers have confidence in dairy markets generally. That man who contributes in any degree whatever to the violation of the farmer's confidence is a detriment to the business.

I hold that every creamery is working under a moral obligation to do those things which will encourage farmers to keep more cows and keep better cows. In other words, it is the duty of every creamery to contribute as much as possible to the up-building of the dairy business by creating in the mind of the farmer confidence in creameries and creamery men. There is no better way for the creamery to discharge the obligation it owes to the industry than to do those things which will strengthen the farmer's confidence in cream markets. The farmer should be made to feel that he is in a reliable business and that when he has a can of cream to sell there is always an honest, reliable market waiting to buy it. He should not be made to feel that when he sends a can of cream to market he must follow it up to see that he gets a square deal.

The farmer profits through wholesome competition in the creamery business just the same as in other lines of business. Competition is always a good thing. It is not only a good thing for the business but it is a good thing for everyone who comes in contact with that business. Competition in the creamery business is a good thing. It is a good thing for the consumer as well as the man who produces the cream.

But it must be honest competition in order to be of real value to anybody. Competition which seeks to mislead and drive out competitors is a curse.

This question of competition in the creamery business is a vital one in connection with the general problem of cream marketing. There is some of the wrong kind of competition in the

creamery business and it is not confined to any particular creamery system. There are several ways that the creamery can make unwholesome competition, and mislead its patrons. It is not necessary for me to go into details. Of course it is never the intention of the creamery doing those things to keep it up. It is only to attract business away from a competitor, hoping at some time in the future to get back the loss.

If the only thing at stake was the transfer of the farmer's business from one creamery to another in a deal of this kind, it would not be so serious, but there are still greater things at stake. The welfare of the whole dairy business is at stake. The confidence of the farmer is at stake. The success of the industry depends upon a solid foundation, namely, the confidence of the farmer and his desire to not only stay in the dairy business but to go into it more heavily.

When a farmer delivers a can of cream to a creamery and he is given a higher test or added weight or a higher price, he of course is encouraged to believe that the market he has been patronizing has been taking advantage of him. Not all farmers are misled in this way but a good many are.

Every can of cream contains so many pounds of cream, it tests a certain percentage of butterfat and the butterfat is worth a certain price based on the market demands, and the quality of the cream.

Competition should have nothing whatever to do with the first two items. Weighing a can of cream and testing a sample of the cream is just a case of regular routine in the creamery. There can be no possible excuse for giving the wrong test or wrong weight, or both, except to take advantage of a competitor, on the one hand, or take advantage of the farmer on the other.

The price that the creamery can pay per pound for butterfat may be influenced by several things but it should always be a legitimate price. By an illegitimate price I mean a price that is offered to the farmer for the purpose of misleading him or for the purpose of gaining his confidence to be violated later.

Every man who has the best interests of the dairy industry at heart should do everything possible to build up confidence in

our dairy markets. The farmer should support and patronize reliable markets. Creamery men and other buyers of the farmer's dairy products should run their business so as to merit the confidence of the farmer on the one hand and the consumer on the other.

Farmers should be made to feel that dairy markets are reliable markets. They should be made to feel that in going into the dairy business they are engaging in a sound business. Dairying is yet in its infancy in this country. It is very much in its infancy right in this section of our state.

In every effort that is made to get farmers to feed and milk more cows we should keep in mind the importance of stabilizing the business in all its branches so that the farmer's confidence may not be violated.

The farmers of this section who are becoming enthused with the possibilities of dairying are being encouraged along right lines. Our Commissioner, Mr. Matthews, is keeping in mind at all times the problem of markets for the farmer's cream. He is pointing out to the farmers of this section the fact that there are exceptionally good markets for the product of the dairy no matter in which form the individual farmer may wish to sell it. Being so near several great consuming centers, the farmers of this section should feel particularly encouraged to go into the dairy business on a large scale.

If there is one thought I would choose to emphasize above others in a discussion of this subject of cream markets, it is that each and every one of us should go from this convention determined that we shall do those things and say those things which will tend to create a greater confidence in the marketing of dairy products in whatever form. I feel that in no way can we better contribute to the upbuilding of this great industry in which we are all so vitally concerned.

HOG RAISING A DAIRY SIDE LINE

By John Nelson, Peoria.

A friend of mine has just returned from a trip through Canada where he was investigating land values for a client of his in the Eastern Townships, just south of Montreal bordering on the states.

He had one of the farmers drive him through the country, and while riding along, he pointed to a certain farm and asked him what he thought that particular land was worth. He replied, "About fifty dollars per cow and ten dollars per hog." Later on, he pointed to another piece of land, and upon asking what this was worth, the farmer replied "he did not think it was worth anything as it had no cows or hogs on it." I don't know whether this is the way you value land in Southern Illinois or not, but it certainly speaks volumes for the dairy cow and the hog.

In Denmark, my native country, if a tenant goes to a landlord to make negotiations for renting a farm, the land owner does not ask him how much money he has in the bank, or how much he is worth, but asks him instead, how many cows he keeps, how many hogs he turns off a year, and how much his cows produce. It is on this basis that a landlord values a tenant over there.

In this country, or at least it has been so in the past, if a tenant wants to rent a piece of land, all the landlord is interested in, that is most landlords, is how much rental can this man pay. He has given no thought or regard to the future of his soil, or, in other words, he does not take into consideration how much more or less his land is going to be worth when the tenant gets through with it. I believe, however, that things are changing and that the desirable tenant will be based on the view which the Dane takes of this matter.

Land in Illinois we do not value per cow or per hog, but we base the valuation upon its production—what it will actually produce. Therefore, a man who keeps a number of cows and hogs on his farm is going to keep up the fertility of his land. Farm land should get better each year, and not go the other way, and this can only be done by rotating the crops and keeping plenty of stock for the production of fertilizer.

Farming today must be conducted on the same basis as any other business, manufacturing or jobbing concern. If there are too many leaks in the business, it will spell failure for the business, and if there are too many leaks on the farm, it will spell failure for the farmer. Therefore, everything on the farm that can possibly be turned into money, should be turned into money, or there will be no dividends at the end of the year for the farmer.

One of our cream patrons, with whom I have recently become well acquainted, drove up to our creamery one day last fall in a very fine automobile. I had a very interesting talk with him and soon learned that he had put considerable study on the economy of producing milk. In fact, he gave me the impression of a successful and intelligent farmer in every sense of the word.

Later on, I had the privilege of visiting this man at his home, and with some exceptions, I found my first opinion of him to be correct. He had an up-to-date dairy barn, with some very fine cows in it. He had kept a record of his cows and what they were producing for him week by week and month by month. He was selling his cream, therefore had a great deal of skim milk. I asked him what he considered his skim milk worth and he replied that this was an item he had not figured up very close, and I told him I thought he had overlooked one of the very important items of his business. He raised a good many calves and they were fine ones.

I then asked him about his hog business, what kind he raised, etc. He stated that he had Duroc Jerseys and took me out to show me his hog house. This was indeed a disappointment to me, although the hog house in itself was a very good one. My

visit out there was in September, and he had the hogs in a lot of about ten square rods, just adjacent to the hog house. From all appearances this lot had not been cleaned up for several months. The stock of his hogs looked fine, at least they showed fine blood. There were some elegant brood sows, and some spring pigs, which weighed about fifty pounds, and which he claimed came in March. This would mean that they were six months old, and if in good condition they should have weighed from 150 to 200 pounds. They showed neglect in every way, but how could you expect them to grow? Of course, he fed them milk and slop, which was all right as far as it went, but the corn he would necessarily have to throw into this litter, and if it was a wet time, you know what kind of a place they would have to dig the corn out of. The hog is then necessarily forced to eat lots of litter which is indigestible, and which cannot be eaten without injuring the vitality of the animal.

It is in just such a lot as the one I have above described that you will always hear of cholera breaking out, as the sanitary conditions in connection with handling a hog are just as essential as the feeding.

Now, there is a man who is not making any money out of his hogs, for no man can make money and handle them in this manner. My contention is this—whenever a hog or a pig is standing still and not putting on pounds, simply existing from day to day or week to week, that pig or hog is losing its owner money. The only way that money can be made out of a hog is for that hog to put on pounds, with the exception of the brood sow. This is one of the essential things I want to impress upon you men, for there is no profit unless the hogs are putting on pounds, whether you are growing them or fattening them.

The growing period of the pig is the time he is making the most money, for the reason that feed which will produce growth, bone and general development, can be cheap feed. By this, I mean clover pasture or any kind of good pasturage, rape, and last but not least, alfalfa, which has come into favor all over this continent in the past few years. I have bought several tons of alfalfa this winter, simply to feed the pigs and brood

sows and there is not a straw of it wasted. Of course, when it is fed as a hay, you don't want the kind that is all grass, as there will be some waste in it. The crop that appeals to me as the most valuable feed crop is the third or fourth crop, as this is free from grasses. This kind of feed, with a little slop, and a good dry bed to sleep in, will certainly make the pig grow. He will do it if he has the opportunity.

I could easily have prepared many tables of figures as I have plenty of them at home on my desk, but this is something I feel you do not care to listen to. Any of the good farm papers published are always glad to supply these tables, giving the results of thoroughly exhaustive experiments; and every farmer should pay more attention to them than the average man has been doing.

I believe I can safely say that in most of the departments of agricultural experiments, we are foremost of any State in the Union.

The business man, no matter where he is located in our State or any other State, knows that the wealth of any community or of any country, must come from the soil. Therefore, to increase the revenue from this source, they are always more than willing to give a helping hand, for in helping the farmer they are helping their own business. Your bankers and business men in Southern Illinois have certainly demonstrated their loyalty to the Dairy Industry through the energy and efforts of our State Food Commissioner, Mr. Matthews.

It takes years to grow a dairy herd of the right kind. You can go out and buy a few dairy cows, and if properly handled they will make money, but I believe that the most successful dairyman is the one whose herd grows up under his own supervision and care. I know that I, myself, have often shown partiality to a calf I had raised myself. Possibly I would buy one which would be far superior from a production standpoint of view, but I was not attached to that cow, as to the one I had raised myself. I care not what line a man follows, whether it is dairying, hog feeding, or any other business, if he is not in love or sympathy with his chosen profession, he will never make a success of it.

I have a letter from Prof. George M. Turpin of the Iowa State College at Ames, in which he gives me the results of their experiments with skim milk and buttermilk. He says:

"Both skim milk and buttermilk are considered to be among the most valuable poultry foods that we have. In feeding tests carried on at a number of experiment stations in feeding laying stock, a marked increase in the number of eggs produced has resulted in an increase, the increase in some cases amounting to as much as one cent per pound for the milk used. The use of a liberal amount of skim milk or buttermilk for feeding chicks has been found to be one of the best preventatives of mortality among chicks from bowel trouble and other diseases. It is highly recommended by all those who have used it. You probably know that either skim milk or buttermilk is made the basis of the ration for finishing poultry for market in practically all of the poultry feeding stations throughout the country. Very few, if any, feeders attempt to finish poultry in these feeding stations without making skim milk or buttermilk the basis of the ration.

"Prof. Dryden, in charge of the poultry department of the Agricultural College at Corvallis, Oregon, believes that freshly green cut bone is slightly superior to milk for feeding laying hens; but with this exception, I believe practically all of the poultrymen of the country place skim milk and buttermilk first as a source of protein for supplementing the grains used in poultry feeding."

Professor Turpin does not state in his letter, does not say whether the milk should be fed sweet or sour, but my experience has been that it should be fed sour. I do not mean by this that it should be kept until it reaches the putrefactive stage, for the length of time it should be kept should vary according to temperatures. In high temperatures, bacteria develop very rapidly. Therefore, some attention should be given to the place where your slop barrel is kept. It should never be left in the sun in the hot weather.

However, there is one thing certain, whether it is pigs or chickens you are feeding, you cannot feed milk sour one time

and sweet the next, to get good results, as the digestive organs will not stand it.

Prof. Turpin and others have valued skim milk at eight cents a gallon. My last year's business on feeding milk, and I have fed considerable of it, over 100,000 gallons, shows that this milk brought me, for feeding hogs exclusively, a little over three cents a gallon.

However, we have to haul this milk four miles to our place, and I buy all my feed on the Peoria market, which you know is away above its value on the farm. Transportation charges have been added, so it costs me considerably more than corn is worth on the farm. The buttermilk which I feed is not worth as much per gallon as skim milk. I know that many people, among them our eminent Prof. Bouska, claim that skim milk and buttermilk are of equal food value, and probably some of it is, but the buttermilk I refer to is thinned down considerably with water, and therefore the food value is somewhat lower than that of skim milk.

One of the most important features in feeding hogs, according to my own experiences, is to have strictly sanitary quarters for them to eat and sleep in, and the next important step, is to keep them of a uniform size in the same lot. If you have a drove of hogs of all sizes and ages together, the little ones are going to suffer, for they are seriously handicapped, and the chances are unless these hogs are on full feed, the small pig will be standing still, and will be called "runts" not pigs, and they are runts, not by nature but owing to insufficient strength to fight their way to the front. I think that lots of from ten to twenty-five are about right, and especially for winter feeding, twenty-five should be the limit.

I have often heard of hogs piling up in cold weather and choking one another. This would never happen if they were divided into proper quarters and if they had warm beds to sleep in. A man who loses his hogs in this manner is simply losing his profits through negligence.

When speaking of the value of skim milk for feeding hogs, I overlooked mentioning one very important thing. I have

given you the profits of my last year's business on feeding hogs, but you must remember that corn was excessively high the entire year. I buy very little ear corn, however, but use mostly ground corn and quite a little bran for finishing. If corn had been at a normal price, or if the hog market has been correspondingly as high as corn, the profits would have been far greater.

My present hog farm consists of only fifteen acres and I am going to run out of land to fertilize. In the past two years I have covered that little place with fertilizer, and I feel sure that I have increased the fertility of the soil fully 200 percent. This winter we are feeding about three hundred head of hogs, and from these three hundred hogs we get from three to four tons of manure a day. Hog manure is conceded to be worth more than any other kind of manure, therefore its value should be at least \$2.50 per ton. Here is an item of profit which I have not mentioned before, and it is indeed a big one.

Of course, in the past year we have had some misfortunes, if you will permit me to call them such, but I think the proper name would be mismanagement, but I have profited by my experience and have learned a great deal about handling hogs.

Cholera is one of the diseases that has made hog raising discouraging in many communities with a great many farmers. Cholera, we know, is a germ disease. Therefore, even with the greatest care given hogs, they can take it under the most ideal conditions; but I do claim that a hog kept in perfect health and in perfect condition, has a greater immunity from the hog cholera germ than a hog whose condition or vitality is run down. Such a hog is susceptible to any germ disease which may come along, and is very easily infected.

As yet, we have never had a case of cholera and we have from 300 to 600 head of hogs on our place at all times. We have had cholera within a half mile of us, but my first thought has always been to watch the physical condition of the hogs.

Questions following Mr. Nelson's address:

Q: Do you have cement floors in your hog houses?

A: I have a cement floor for my brood sows but cover it with boards. I have built that house and hired all the labor, it is 100 ft. long and 40 ft. wide, cement floors and drains.

Q: How large lots do you have for them to run in?

A: 12½x25 ft. deep. My feeding is a little different from farm feeding. I went into the hog business, in fact was sort of forced into it because I could not bear to see the butter-milk thrown into the sewer. My contention is that the time is not for distant when no creamery can operate and throw all the buttermilk into the sewer. The margins of profit are getting closer all the time, therefore to make a profit we have got to turn into money everything that is of any value, and we know buttermilk has a great value if properly handled.

I went into the hog business as an experiment; we got some interesting results. I went into it in a commercial way, I wanted to know myself what the buttermilk was worth.

Q: Do you try to raise all your own hogs?

A: Practically all. I have 70 brood sows now.

Q: Do you consider corn and bran valuable?

A: I cannot give you the exact figures. Feeding this buttermilk is an entirely different proposition than feeding skim milk which has been subjected to high temperature in the pasteurizer, the casein has been hardened and is not as digestible as the raw buttermilk from the dairy. You take raw milk, it is much more easily digested for either the human being or the animal than pasteurized milk when pasteurized at a high temperature, because the casein is hardened and is not as easily digested as the casein in the raw milk.

Q: In feeding, do you prefer sour skim milk to sweet?

A. For either hogs or chickens my opinion is that it

should be fed sour for many reasons. It is impossible to vary on your supply of feed, the hogs have to be fed three times a day and necessarily your stock of milk is going to sour, and if you feed them once sweet and the next time sour you are going to have trouble; you want to feed them the same milk every time.

Q: How much corn do you feed with the milk for best results?

A: One full feed, they get all they can eat.

Q: What proportion, how many pounds of grain?

A: We are feeding 300 head of hogs. Take it right now, they are getting each day 400 lbs. of meal, 500 gallons of buttermilk, 250 pounds of bran, that is distributed in various lots; and we are feeding about 400 pounds of alfalfa hay a day to the young pigs and brood sows. The brood sow's ration should be the same as a good grown pig.

Q: How do you prepare the alfalfa hay?

A: Just as a hay. They have special grinders. I think it is ground in an alfalfa meal as they do in lots of their mixed feeds. It is more easily digested for the hog especially when it is in a meal form than it would be from raw hay. We are getting very good results.

Q: Do you think there would be any bad results in letting the buttermilk go through an underground pipe 300 yards long and going into a cistern, where the pipe cannot be kept as sanitary as it should be?

A: I think it is barely possible that you will get a growth of bacteria that is going to be harmful to your stock. The hog does not differ so much from the human in its requirements. I think you will be very much disappointed, you will find this, it will clog up.

THURSDAY, 1:30 P. M.

Mr. Caven makes announcement of the award of prizes as follows:

CARBONDALE DAIRY REWARDS.

Following are the awards in the different contests at Carbondale and the scores on butter at 90 and over. Conditions at the time of the Convention were not favorable for making fine butter and a considerable number of butter exhibits scored under 90. The awards are here given in the order as placed by the judges:

CREAMERY BUTTER

1—A. J. Spohn, Morrison	94.
2—Sanitary Cry., Amboy	93.5
3—A. M. Kleinhofer, Beecher City	93.
4—Peter J. Peterson, Round Lake	92.66

DAIRY BUTTER

1—J. W. Bilderbach, Carbondale	93.5
2—H. C. Peck, Atlanta	93.0

BUTTER JUDGING CONTEST

1—J. R. Newberry,	Newton, Ill.
2—F. A. Jorgensen	Urbana, Ill.
3—L. T. Potter	Jacksonville, Ill.
N. W. Hepburn, University of Illinois.	

CORN AWARDS

WHITE VARIETIES

1—and Sweepstake, H. C. Peck	Atlanta
2—S. M. Ripley	Belleville
3—E. S. Helms	Belleville
4—R. O. Stearns	Herrin
5—Ed Stearns	Herrin

YELLOW VARIETIES

1—W. J. Rap	San Jose
2—H. C. Peck	Atlanta
3—Ed Stearns	Herrin
4—R. O. Stearns	Herrin
5—E. J. Petery	Elkville
E. T. Ebersol, Judge of Corn, University of Illinois.	
H. Bruce Piper, Assistant, Carbondale.	

COW JUDGING

JERSEY GRADE

1—M. J. Bryan	Carbondale, Ill.
2—M. G. Robinson	Carbondale, Ill.

HOLSTEIN GRADE

1—M. J. Bryan	Carbondale, Ill.
2—J. Bilderbach	Carbondale, Ill.

JERSEY REGISTERED

1 and 2—M. G. Robinson	Carbondale, Ill.
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HOLSTEIN REGISTERED

1—Grant Parrish	Carbondale, Ill.
Lewis N. Wiggins, Judge, Springfield.	

CREAMERY BUTTER

(Scores at 90 and Above)

A. J. Spohn, Morrison	94.
F. J. Weddige, Big Rock	90.66
Peoria Creamery Co., Peoria	91.16
Redmond Brothers, Waterman	92.16
United Dairy Company, Chicago	91.66
Sanitary Creamery Co., Amboy	93.5
Peter J. Peterson, Round Lake	92.66
A. M. Kleinhofer, Beecher City	93.

DAIRY BUTTER

T. W. Bilderbach, Carbondale	93.5
Sara J. Schwartz, Elkville	92.5
Miss E. E. Kimmel, Elkville	92.
Mrs. H. Easterly, Carbondale	92.

Chas. Foss, Cedarville	90.75
F. B. Miller, Carterville	90.5
Mrs. Odare, DeSota	92.5
James Hanna, Murphysboro	90.75
M. C. Judy, Tallulu	92.
H. C. Peck, Atlanta	93.

MILK AWARDS

Alexandria Farms Dairy	Aurora
Trimbel Bros.	Trimbel
Mrs. John Boucher	Carbondale
W. E. Phifer	Carbondale
Harry H. Etherton	Carbondale

Mention should be made of the excellent samples of butter-milk, certified milk, and cream entered by the Alexandria Farms Dairy, stating, however, that no prizes were offered for such products. So the samples received no recognition in the scoring contest.

ANDREW A. WOLLIN,
State Food Department.

REPORT OF RESOLUTIONS COMMITTEE.

Mr. Credicott:

In submitting these resolutions, we want it understood that we have merely put them into some shape, and that the same are open for correction as the Convention may see fit:

WHEREAS, This Forty-Second Annual Convention is undoubtedly one of the very best gatherings ever held by this Association,

RESOLVED, That we heartily thank the citizens of Carbondale, the Mayor, Chamber of Commerce, press of the city, and the committee of business men who have worked incessantly to make our stay in their city pleasant as well as profitable. That we also extend our thanks to the speakers and to the

Normal University Orchestra for their contribution to our splendid program. That we also express our appreciation to the exhibitors of dairy cattle, dairy supplies, dairy products, corn, etc.

RESOLVED, That we heartily commend the splendid administration of our State Food Commissioner, Hon. Scott Matthews, and his able assistant, Mr. John B. Newman, in promoting the best interests of the dairy industry. In this connection we enthusiastically endorse the movement which the commissioner has promoted looking toward more and better cows for Illinois. Through the local bankers and other business men in the different communities, renewed interest is being aroused in dairying and a splendid work is being accomplished.

RESOLVED, That this Association approves the general plan outlined by the State Food and Dairy Department for the grading of cream and the payment for same according to quality, and that we urge every cream producer and cream purchaser to co-operate with the authorities in every way possible.

WHEREAS, It being a well known fact that pasteurization of dairy products not only promotes better quality, but is in the interests of public health, therefore

BE IT RESOLVED, That we urge the enactment of a compulsory pasteurization law in Illinois to cover all dairy products. According to statistics recently compiled by our State Food and Dairy Department, 93.18 per cent of the creamery butter made in this state in 1915 was churned from pasteurized cream, therefore,

BE IT RESOLVED, That we urge the general dissemination of this fact to the consuming public as a means of assuring them of the safety and superior quality of Illinois creamery butter.

RESOLVED, That we reaffirm our position in favor of legislation that will safeguard the dairy industry against the fraudulent sale of butter substitutes. The oleomargarine forces are well organized and they will undoubtedly make a supreme effort during the present session of Congress to secure the legislation they wish. The National Dairy Union is looking after

our interests at Washington and we urge every man interested in any way whatever with dairying, to give his hearty support, financially and otherwise, to the National Dairy Union.

RESOLVED, That we thank our good friend, Ed. Sudendorf, for his substantial expression of good will, and that we in turn wish him many more years of health and happiness.

RESOLVED, That we thank our officers, President J. P. Mason, and Secretary George W. Caven, for their splendid work in arranging such a successful convention, and that we further recognize their good work in holding auxiliary meetings during the year.

WHEREAS, That Divine Providence has seen fit to take the dear and beloved wife and mother of our loyal member and co-worker, Mr. Andrew Fredericks, and his children;

BE IT FURTHER RESOLVED, That this Association instruct its Secretary to send him our heartfelt and sincere sympathy and the Association sincerely hopes Mr. Fredericks will accept our sympathy and live down his great grief and sorrow.

Mr. ———: "Mr. President, I move the adoption of the report of the Resolutions Committee which we have just listened to."

Mr. Caven: "I second the motion." (Carried.)

Mr. Mason: "Next, is the report of the Nominating Committee. Are they ready to report?"

Mr. Caven: "They will be ready in about five minutes."

REPORT of Committee on Nomination——

Mr. Nelson of Springfield, Chairman:

"Mr. President, as Chairman of the Nominating Committee, I wish to make the following report of your committee:

For President—Mr. J. P. Mason, of Elgin.

Vice-President—Mr. H. C. Horneman, of Watseka.

Directors—J. P. Mason, H. C. Horneman, H. J. Credicott,

Freeport; Sidney B. Smith, Springfield; John B. Newman, Elgin; H. P. Irish, Farnia; and Fred Zimmerman, Washington, Illinois.

(Signed)

JOHN NELSON, Chairman,
ELMER MACK,
H. G. EASTERLY,
Nominating Committee."

Mr. Borman: "Mr. President, with your permission I will put the motion before the members of this Association, that the Secretary be instructed to cast a ballot for the election of the officers, for the ensuing year."

(Motion seconded and carried).



ONE DAY DAIRY MEETINGS.

Amount of Work Done by the Association Double That of Any
Previous Year.

(Secretary Geo. Caven.)

During the year ending July 1, 1916, the Association held twenty-eight one-day dairy meetings, and besides this number under the direct supervision of the Association, President J. P. Mason assisted State Food Commissioner Matthews in almost as many dairy meetings held under the commissioner's directions. Nearly all of these meetings were held in the south half of the State where dairy development is needed, and every meeting was productive of good results, several bringing about the organization of county dairy associations.

The greatest results followed the one-day meetings in Carbondale and Harrisburg. In the former, after a one-day meeting, it was decided to hold the Annual Convention there and the great success of that meeting, the interest it aroused and the co-operation brought about by which the bankers and merchants joined in the dairy extension movement, made possible the Bull Day Celebration in Carbondale April 1, and the Dairy Day Celebration in Harrisburg June 24.

In his address welcoming the people at the Bull Day Celebration April 1, Mayor E. K. Porter of Carbondale said:

"In January we had the honor of entertaining the Illinois State Dairymen's Association and its convention, and it was one of the most enthusiastic and profitable meetings in the history of that organization. It developed an awakening in an industry which is in its infancy in this end of the state, this magnificent demonstration being the outcome of that state meeting."

The one-day dairy meetings held by the Association included the following: Moro, Warden, Marine, Bone-Gap, Hidalgo, West Liberty, Shelbyville (two meetings), Assumption, Ram-

sey, Vernon, Mt. Vernon, Washington, El Paso, Farmington, Mason City, Kenney, Red Bud, Grant Park, Harrisburg, Litchfield, Mt. Olive, Metamora, Morton. Attendance was good at all these meetings and at many of them a much larger number of farmers attended than had been expected.

These meetings, together with those held by the state food department, and the interest they aroused, made it possible for the State Food Commissioner to get together, by private subscription, a fund for an active campaign on the part of the State Food Commission and the creation of a fund by bankers for the purchase of cows that have been sold to farmers at cost. Up to July 1 about 65 cars of dairy cattle had been placed on farms in the southern half of the State and instruction is being given to the purchasers of these cows, and to farmers in communities where the blooded dairy bulls have been placed, on how to build up a dairy herd, how to market their dairy products, how to improve fertility of their farms, etc.

At Carbondale.

"Bull Day" drew a crowd of over 15,000 visitors to Carbondale, Illinois, April 1, to celebrate the first big dairy extension movement ever held in the United States.

Because of bad weather the attendance was not so large as expected, but those who did come were representative of the leading business men, bankers and farmers in the State. A special train brought representatives of the Chicago Chamber of Commerce, headed by C. H. Markham, President of the Illinois Central, and J. C. Clair, Industrial and Immigration Commissioner of the road. The St Louis men were conspicuous in the celebration and they also came in a special train. Prominent among them were J. D. Lynn of the Business Men's League and H. J. Hodson of the East St. Louis Chamber of Commerce. The Illinois State Dairymen's Association was well represented by a number of members.

A feature of the parade was the herd of thoroughbred Holstein bulls which was given to the farmers of Southern Illinois by the Illinois Central Railroad. State Dairy and Food

Commissioner W. Scott Matthews, who was the originator of the dairy extension plan, with other prominent State officials, led the parade. School children in wagons, the Carbondale Company of the National Guard, the Carterville Jersey Cattle Association, the Chicago, St. Louis and other delegations followed the cattle to the Elk Club, where speeches were made.

The plan to give Illinois Dairy farming a boost was conceived of by Mr. Matthews several months ago, when he called together a body of big business men and explained to them the absolute necessity of interesting the farmer in buying more and better cattle. As a result of this meeting, sufficient money was subscribed to carry on the work.

The monster demonstration at Carbondale was given for the express purpose of impressing upon the farmers the many advantages to be gained by dairy farming. The meeting was a success. At the banquet in the evening Senator Richard J. Barr said: "While I am a Republican and Mr. Matthews a Democrat, I want to be placed on record as saying that he has done more for the farmers of Illinois in two years than all of his predecessors combined."

Bulls were given to the following communities by the Illinois Central: Pinckneyville, Du Quoin, Finney, Murphysboro, Makanda and Carbondale.

Too much credit cannot be given the men behind this movement, because it is the making of Southern Illinois. The people of Carbondale have shown themselves to be in the front rank as hosts and the huge crowd was taken care of perfectly.

At Harrisburg.

Dairy farming in Southern Illinois was given another strong boost at the celebration of "Dairy Day" at Harrisburg, June 24. Many distinguished speakers were on the program, and a big parade, speeches, contests, and the award of prizes kept the big crowd interested.

President A. H. Smith of the New York Central Lines, who made a special trip here for the purpose, awarded two prize calves—a bull and a heifer—to the boy and girl who won the

cow-judging contest for children. After much pulling and hauling in which W. Scott Matthews, Illinois Dairy and Food Commissioner, proved of valuable aid, the calves were brought to the top of the court house steps and the names of the winners were announced.

"Jimmie Baker," called out President Smith. The freckled face of a thirteen-year-old boy popped up under the railroad official's elbow. Jimmie had heard about the decision of the judges in advance and saw to it that no time was lost in responding to his name.

"Jewell Thomas," next called President Smith. There was no response. Finally, a search of the courthouse grounds revealed the missing Jewell, and she was conducted to the platform. It required some little persuasion to get her to face the spectators and when she did, they applauded.

Jewell soon forgot her shyness in her admiration of "Kate," the four-months-old heifer that a successful filling out of her score card had won for her. Much to the delight of the spectators, she implanted a good kiss smack on the forehead of the black and white Holstein, at the same time giving her new pet a hearty hug.

Particular interest, however, was centered in the division devoted to pure-bred bulls and cows—chief factors of the celebration in whose honor the day had been set apart.

The calves are valued at \$600 in the aggregate and were donated by President Smith for the purpose of encouraging children in the dairy industry. The winners of the prizes are children of farmers in Saline County. The boy made a perfect score as his marks tallied with those made by the agricultural experts. Over 200 children were contestants in the event.

The speakers were B. H. Rawl, chief of the Dairy Division of the United States Department of Agriculture; W. W. Marple of the Business Men's Dairy Extension Movement; Commissioner W. Scott Matthews of the Illinois Dairy and Food Department; Len Small, President of the State Board of Agriculture; J. P. Mason, President of the Illinois Dairymen's Association, and President Smith of the New York Central Lines.

True to its name it was a real dairy day with milking contests, cow-judging contests, and a big parade of fine dairy cattle including ten bulls donated by the Big Four Route for the use of farmers in this section.

Mounted on a barrel in a section of the main street that had been roped off for cattle, John M. Crebs, Chairman of the Dairy and Agricultural Committees of the Illinois Bankers' Association, called out the numbers of the high-grade cows purchased by the four banks of Harrisburg to be allotted to the farmers of this section on an easy payment plan to encourage them to begin dairying.

Report by Harrisburg Evening Chronicle of the Celebration:

Bands and bulls, cows and crowds filled the streets of Harrisburg today in one of the most successful "Dairy Day" celebrations held in the state. Many distinguished visitors were present and the speeches, contests and award of premiums and prizes which followed the big parade kept the big crowd interested.

Because of the rain the night before original plans for holding part of the program at the fair grounds was abandoned. The court house square was selected instead and here the principal events of the day were staged.

All in the business district and private homes on the street up which the delegates marched from the railroad station were specially decorated for the occasion. Official colors of purple and white with the American flag interspersed, were stretched in long festoons from the court house tower to the buildings across the adjacent streets.

The west side of the square had been roped off for the exhibition of the registered bulls and dairy cows. This was the section that held chief interest for hundreds of farmers and stockmen who lined up before the enclosed space and critically examined the animals before the parade.

Up to the time when Sheriff Geo. Russell, as marshal of the day, blew his whistle for the marchers to fall in line, delegations were arriving over the Big Four Route and interurban line. The scene about the Big Four Route station was a lively one.

The Evansville delegation made the hit of the day. They arrived over 300 strong, with two bands and a squad of boy scouts. A group of pretty girls attired as milk maids and carrying bright tin pans was a feature of the Albion delegation.

The first section of the through train which arrived at 9:20 a. m. brought President A. H. Smith and officials of the New York Central Lines; W. Scott Matthews, head of the Illinois Dairy and Food Department, and John B. Newman, Assistant Commissioner.

B. H. Rawl, chief of the dairy division of the United States Department of Agriculture, was also on this train together with members of the Business Men's Dairy Extension Movement of Illinois, including W. W. Marple, and E. K. Slater, members of the Executive Board of that organization.

Long before the parade was ready to start thousands of spectators were packed solid from the curbing to the store fronts. They cheered the bands and boy scouts and laughed at the mirth-provoking signs carried by the Evansville delegation and the "cutups" of the "rubes" in the Albion delegation.

Particular interest, however, was centered in the section devoted to the pure-bred bulls and cows, chief factors in the delegation in whose honor the day had been set apart; and no man present bore a happier smile than W. Scott Matthews, State Dairy and Food Commissioner, originator of this form of celebration to impress communities with the advantages of dairying correctly conducted.

True to its name it was a real dairy day with milking contests, cow-judging contests and speeches by foremost authorities on dairying and agricultural subjects forming a prominent part of the program; and all carried out to the delight of the many thousands of visitors.

The Parade.

The parade formed at the depot and marched up to the court square, thence on West Main to Walnut east to Vine and on Vine to the square.

Sheriff Russell, acting as officer of the day, headed the pa-

rade followed by the Harrisburg band in handsome white uniforms.

The automobiles which led the parade contained the following prominent men who were on the program for the principal addresses of the day:

President A. H. Smith of the New York Central Lines; W. W. Marple of the Business Men's Dairy Extension Movement of Illinois; Len Small, President of the State Board of Agriculture; Frank O. Lowden, leading farmer and stock raiser; John M. Crebs, Chairman of the Dairy and Agricultural Committees of the Illinois Bankers' Association, and Commissioner W. Scott Matthews of the Illinois Dairy and Food Department.

The Palace Band was followed by delegations of school children from Pankeyville.

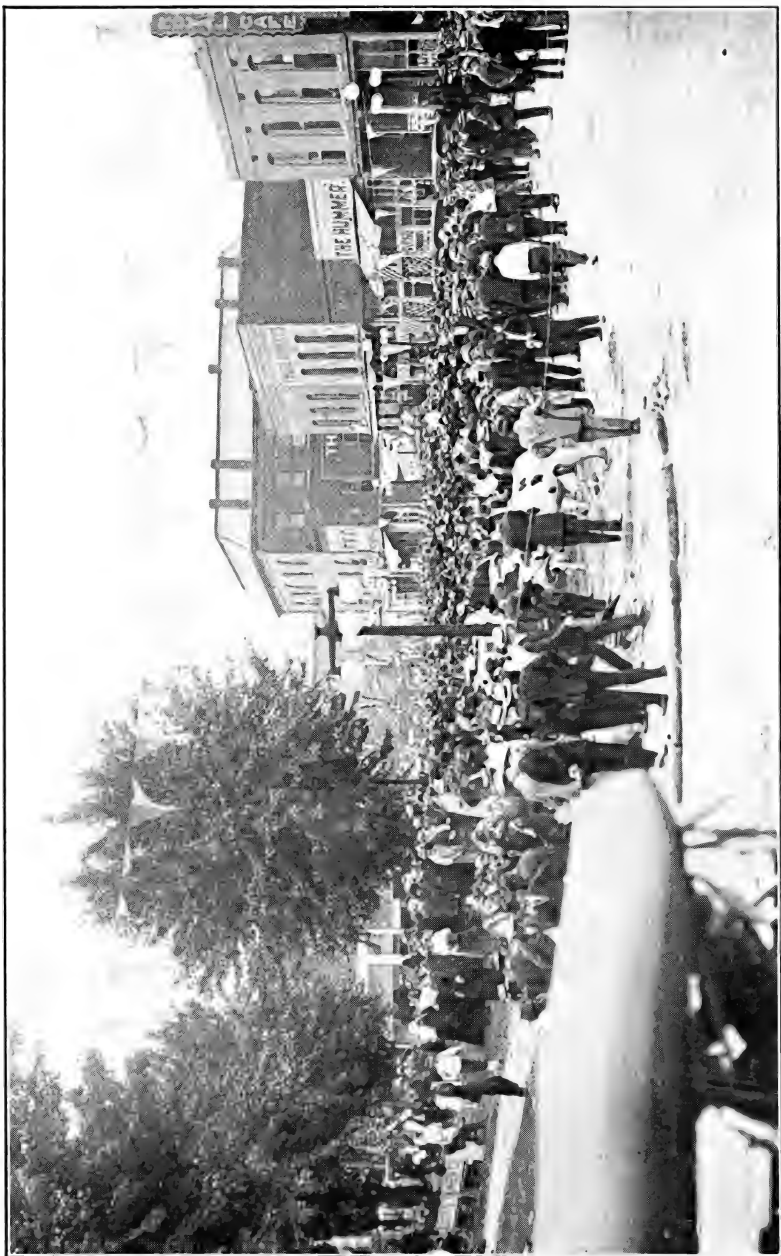
The Rotary Club of Evansville, 223 strong, was headed by a band from that city and the Evansville boosters made a fine showing. They are a bunch of real live wires.

Carrier Mills' band came next in parade and were followed by a fine Holstein bull purchased by J. C. Chapman from the New York Central Railroad. Then came the Carmi delegation and a herd of Holstein cattle. The Albion Band preceded a large delegation from Albion followed by milkmaids dressed in red and white and carrying milk pails.

The Equality Band, in white uniforms, were at the head of the Equality delegation. Then came Jersey cattle from C. H. Baker's stock farm at Raleigh. The Spring Hill Stock Farm had the next herd of cattle in line.

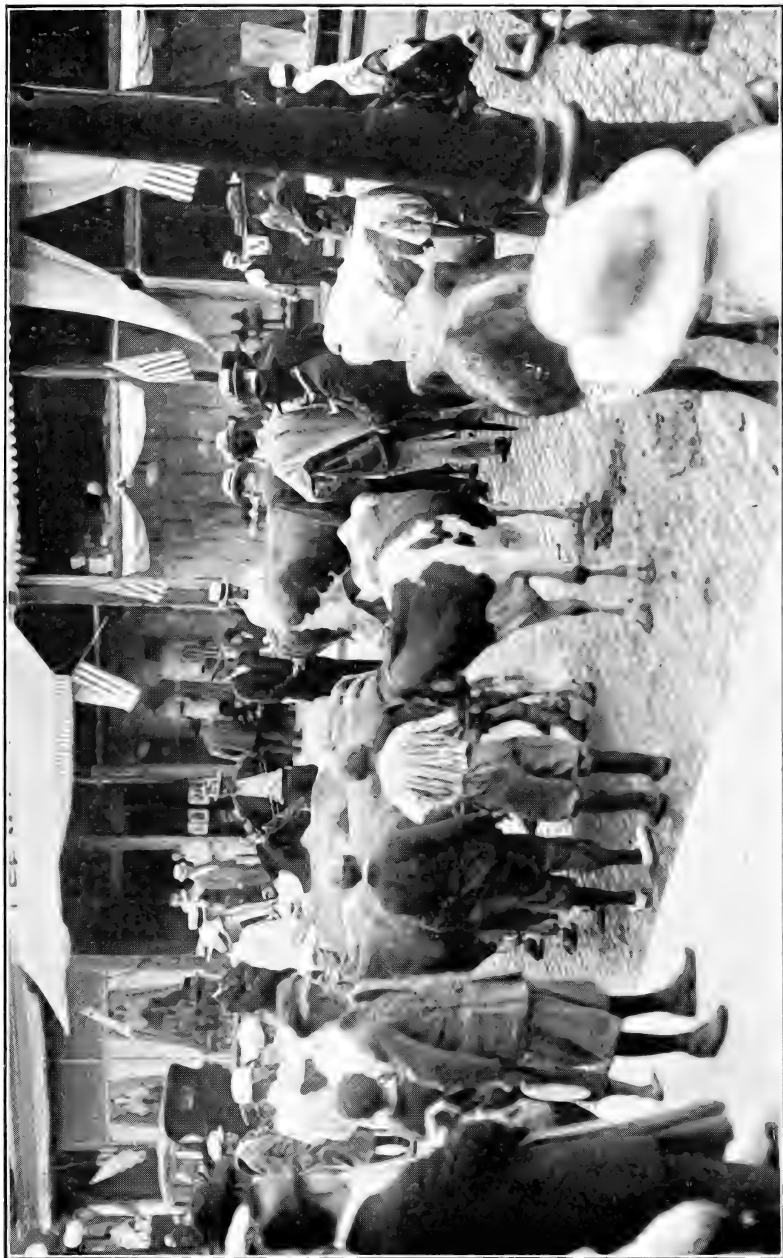
Then came handsomely decorated wagons belonging to the Harrisburg Transfer Company.

Other distinguished guests included S. P. Stevens, owner of Oak Glenn Farm at Bartlett, Ill.; W. C. Byers, Agricultural agent for the New York Central Lines west of Buffalo; Prof. P. G. Holden, head of the Agricultural work for the International Harvester Company; H. A. Meyer, Vice-President and General Manager of the New York Central Lines; C. J. Brister, Traffic Manager, and Paul A. Platz, Advertising Manager, for the same railroad.



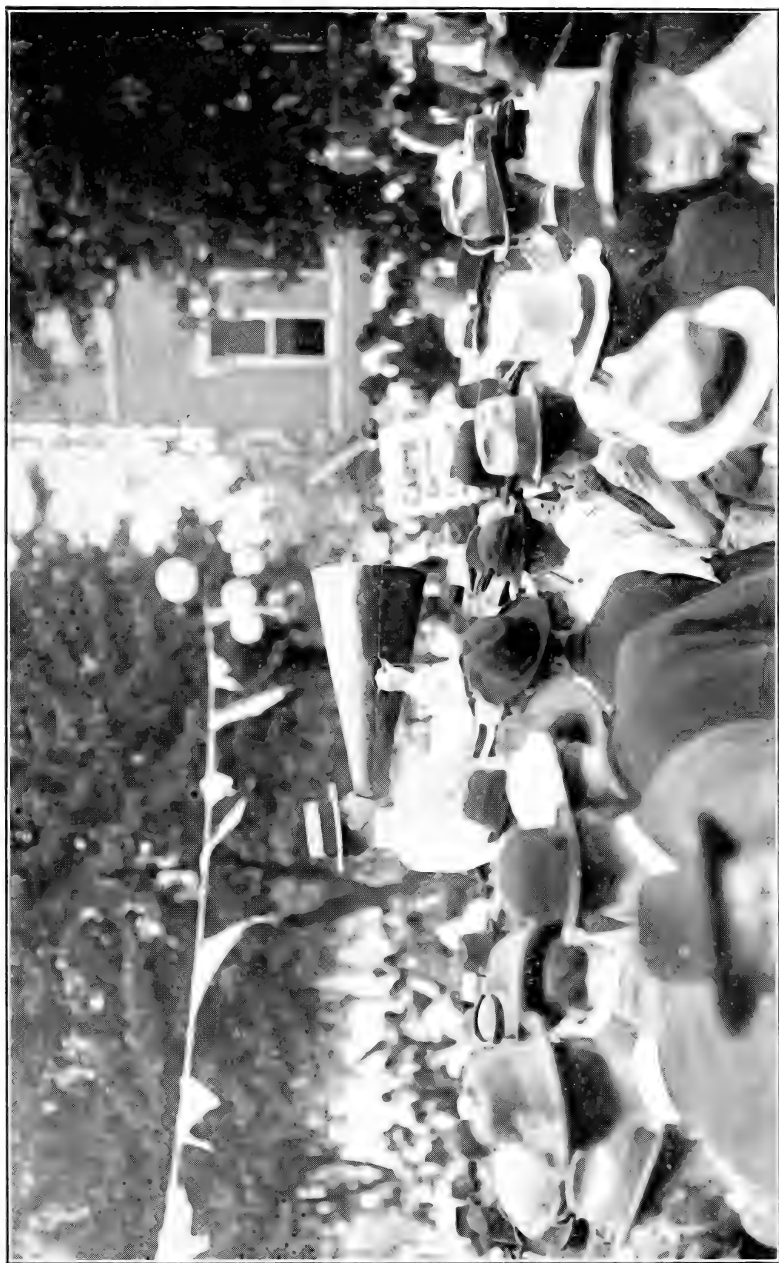
Two carloads of cows purchased by the four banks of Harrisburg, Ill., to be sold at cost to farmers, were, tethered in front of the Court House, where they were critically examined by hundreds of farmers.

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A view of the cows at Dairy Day Celebration in Harrisburg, June 24. Farmers examining the animals offered for sale.

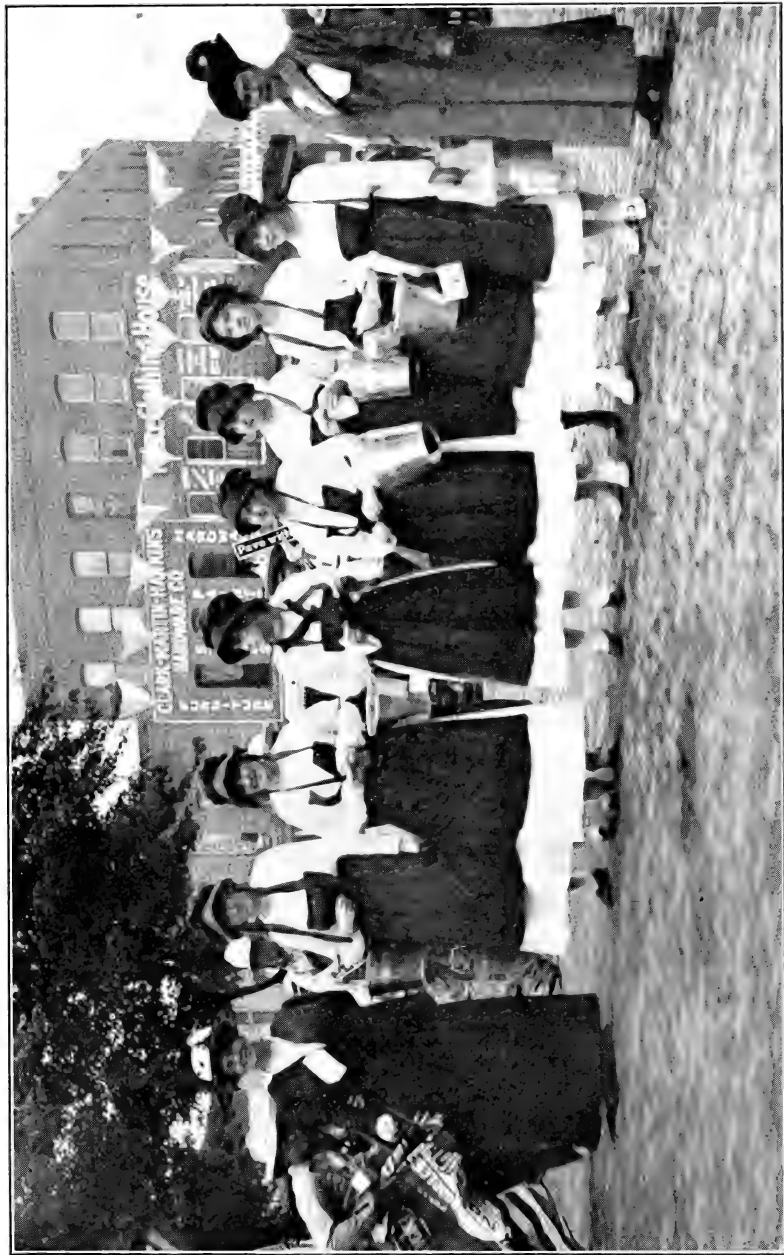
UNIVERSITY OF ILLINOIS LIBRARY



"Who wants Cow No. 45? The price of milk in our big cities was never so high as it is today. Remember, these cows to you at exact cost."

John M. Crebs, official representative of the Illinois Bankers' Association, mounted on barrels in the street and using a megaphone, had charge of the allotment of the cows at Harrisburg.

UNIVERSITY OF ILLINOIS LIBRARY



Albion sent a group of pretty Milk Maids to Harrisburg—well chaperoned—who carried bright new tin pails and wore red sunbonnets and aprons—and, pleasant smiles.

UNIVERSITY OF ILLINOIS LIBRARY

President Smith in his address complimented the work being done in Southern Illinois by the banks and through the Illinois Dairy and Food Department.

Extracts from his address are as follows:

"No doubt you have told many what a great man a farmer is. Probably you will hear more of it between now and next November, this being a Presidential year. I am not running for an elective office, still I would like to bring to your attention seriously for a few minutes a problem that does lie close to my heart—the problem of the railroads. To solve that problem we need your sympathetic co-operation.

"The farmer is especially interested to see that his transportation needs are fairly met, and they cannot be adequately without fair treatment of the corporation which have undertaken to serve you in that capacity.

"Down in the Metropolis district of New York City there are five million adults and two million babies. Transportation lines must be kept open in order to feed that vast population. If a great storm delays milk trains which come from distances hundreds of miles away the babies are threatened with hunger. The dairy and meat trains must come in regularly and almost constantly or the population could not live where it does.

"The railroad has not only brought the farm to the marketplace, but it has opened the markets of the world to almost every farmer. Illinois butter is consumed throughout civilization and your meats and cereals help to feed the workmen of our great cities who are devoting themselves to making your shoes, clothing, machinery, tools and what not.

"Realizing the importance of agriculture to their own industry—transportation, railroads have established Agricultural Departments to promote the welfare and success of farming communities along their lines.

"We are co-operating in every way we can with the Dairy Committee of Illinois Bankers' Association and the State Dairy Commissioner in the plan which you have been extensively using for overcoming the difficulties in getting started in dairying in Southern Illinois, namely: the wholesale purchase of good milk

cows and the acquisition of high class pure-bred sires for further stock improvement."

**Address of President A. H. Smith of the New York Central Lines, at
Harrisburg, Ill., Dairy Day Celebration.**

"Ladies and Gentlemen :

"It is a pleasure to get out and exchange ideas with people who have the same common interest and problems that we have, and I find it profitable to meet men with viewpoints and interests different from our own.

"A farmer was once described to me as a man who made his money in the country and spent it in the city, while an agriculturalist was said to be a man who depended upon the city for the income which he spent upon a farm. Under this classification I fear that my name will be found among the agriculturalists. However, that may be, I yield to none in the intensity of my interest in the matters which bring us together here today.

"When a man, having spent his life in other callings, finally attains a measure of success, he is almost sure to indulge the dream of nearly every city dweller and buy a farm. Long before it actually becomes his, he has turned over in his hand how he will apply up-to-date business methods to the world-old problems and make the farm a model both in appearance and in results. A farm of his own is a wonderful thing for the tired business man of our cities. Some fellow has explained that fleas are quite valuable in that they made a poor dog forget his humble origin. A city business man can easily leave his other troubles at his office when he goes out to his farm. His experiences there, however, serve a better purpose than that. They increase his respect for the modest fellow who without other income and frequently with a mortgage to carry, makes the soil yield him a good living and sometimes more.

"Our government very properly has also aided and encouraged the farmer to a greater extent than the present time. The head of the Agricultural Department of the Federal Government is a member of the President's Cabinet. That Department maintains laboratories, conducts campaigns against disease, organizes

the clubs, educates the people and conducts other activities calculated to help you in your work. Today there are sixty-six agricultural colleges covering every state in the union and receiving government support. Each is trying the best it can to promote the well-being and happiness of the country through attention to this great industry.

"Agriculture and transportation in this country are interdependent. You need the railroads, and if there are abuses or arbitrary powers to be curbed it is not starvation, strangulation or proscription that should be used to make the reform.

"My friends, progressive railroad executives have no quarrel with reasonable laws. Many people seem to have the idea that railroad men habitually oppose constructive legislation. But it is not true that we are opposed to such legislation or to progress. You will find the really progressive roads of the country constantly experimenting with machines and methods and taking up the really desirable and standard far in advance of statutory requirement.

"The difficulty about legislative requirement is that it leaves little room for the exercise of judgment. Take for example the so-called Full Crew laws which have been forced upon us in the States of New York, New Jersey, Indiana and Pennsylvania. In all three of these states there are public service commissions, supported by the people, clothed with ample power and supposed to be possessed of judgment sound enough to enable them to act in case any railroad should disregard safety of operation or require more of its men than they can or should do.

Bob and Kate.

"Anxious that as much time as possible should be given to the compilation of the score cards in the cow-judging contest for children owing to the value of the prizes to be awarded Prof. R. E. Muckelroy of the Southern Illinois Normal University, announced the beginning of this feature shortly after 11 a. m.

"Now remember, boys and girls," concluded Prof. Muckelroy, after preliminary remarks, "everybody for himself, or herself, alone. After filling your card, you must be able to raise

your right hand—each and all of you—and swear that you filled it out without assistance of anyone. Do you remember?”

Hundreds of heads nodded in the affirmative, and then Prof. Muckelroy, with the aid of several assistants, began dealing out the score cards. Two long lines of flushed and eager faces were drawn up before him—one for the girls and one for boys—and a short time later the youngsters with all the seriousness of professionals were examining the dairy cattle lined up for their inspection, and transferring their impressions to the score charts.

Many a little girl's heart fluttered and many a boy's fingers got cramps as they stopped long enough in their work now and then, to cast furtive glances towards the spot where “Bob” and “Kate,” all unconscious of the flurry they were causing, were quietly munching their luncheon of alfalfa hay and ground feed.

The “grown-ups” apparently were just as much excited over the situation as the children. Of all those who were intent on following the movements of the children, none showed keener appreciation than President Smith of the New York Central Lines, donor of the two prize calves, who stood near by with a group of friends.

An occasional remark showed the interest he was taking.

“They're the spryest lot of youngsters I ever saw,” he said, “and the best of it all is they seem to know just what they are about. It will be a close contest.”

His eyes twinkled as he followed the contest with a rapid series of comments, seeming to take in the work of each individual boy and girl with a sweep of his glance.

First To Arrive on Time.

The first delegation to arrive in town was the one from Albion. Many of the members brushed aside the train crew and leaped from the steps in order to gain the honor of reaching the platform first.

The first farmer in town was Joel Tompkins, who drove ten miles in a buckboard with his wife and two daughters and arrived at the court house square at 6 a. m.

Prizes Awarded.

The prizes for features in the parade and the best decorated music were awarded as follows:

Evansville, Ind., prize of \$25 offered by the Business Men's Dairy Extension Movement for the largest delegation outside of Saline County.

Pankeyville School District No. 45, first prize of \$25 offered by the Clark-Martin-Hawkins Hardware Co., for the largest representation of any school district in Saline County, exclusive of No. 43.

Dorrisville School District No. 95, second prize of \$15 offered by the same firm in the same event.

Henry Baker, prize of \$15, offered by Clark-Martin Produce Co., for the largest number of cattle on exhibition owned by any one man or firm.

Fred Patterson, first prize of \$10 offered by Charles V. Parker for the best appearance of any herd and attendants in the parade.

Chas. V. Parker, second prize of \$5, offered by the foregoing firm in the same event.

Ozment-Hine Co., prize of \$10 for the best decorated business house in Harrisburg.

These awards were announced by Prof. Harry Taylor of the Township High School, T. O. Elliott, superintendent of the city schools, and B. D. Gates, superintendent of the County Schools, members of the committee having this matter in charge.

James H. Baker, 13 years old, won the prize bull calf given by President Smith of the New York Central Lines.

Jewell Marie Thomas, 15 years old, won the heifer calf.

These two scored highest in the cow-judging contest conducted by Prof. Muckelroy.

What State Food Department Is Doing.

On behalf of the Illinois Dairy and Food Department, I am very glad to tell you something about what we are doing to develop the dairy industry in Illinois.

Our aim is to get more cows and better cows for the farmer and to encourage him to conduct his dairy according to the most approved methods.

The principal forces in the field that are co-operating with us to secure these results are:

The Illinois Bankers' Association.

The Business Men's Dairy Extension Movement
of Illinois.

The Illinois State Dairymen's Association.

The Railroad Companies.

The Commercial Clubs.

Three active campaigns are now under way which I will describe briefly under their respective headings:

DAIRY DAY CELEBRATIONS:—These are held under the auspices of the Commercial Club in the town selected, and the celebration is enlivened with a parade, speeches, cow-judging contests, milking demonstrations, moving picture exhibitions, and other attractions. The high-grade cows purchased by the banks, and the pure-bred bulls contributed by the railroads for the use of the farmers, are featured in the parade.

CALF CLUBS:—The banks organize these clubs for the purpose of arousing the interest of the children in the dairy industry. For example, a bank announces that on a certain date it will give high-grade heifers and yearlings to the care of boys and girls in the community whose fathers or relatives agree to sign notes running for ten or twelve months. At the end of this period, the bank agrees to hold a public sale at which the children are to be given the profit realized on the animals they have cared for; or if the note is paid, they are allowed to retain possession. As the animals have by that time increased in value and most of them have calves, the profit is a substantial one.

POOR FARMS:—This is a plan to co-operate with the county authorities to introduce a model dairy on every County Poor Farm. It is pointed out that this will not only prove a source of profit to the institution, but will bring a strong influ-

ence to bear upon the farmers in that county to adopt a similar policy. It is recommended that the dairy so introduced, be conducted as a practical demonstration farm for the benefit of the community.

The parts taken by the different forces committed to the one purpose—that of getting the farmers to take up dairying on profitable lines—are as follows:

The banks finance the project; that is they furnish the capital to purchase the high-grade cows in carload lots and turn them over to the farmers, accepting the latter's notes as payment.

The railroads contribute the use of the pure-bred bulls to the farmers along their lines, that the herds may be built up and improved.

The Business Men's Dairy Extension Movement of Illinois, works in direct conjunction with our department to get things started and to pave the way for the operation of the banks and the railroad companies. This organization furnishes the funds for the initial expenses. At the present time our department is forced to work without the aid of an appropriation from the state, but we are in hopes, from the showing made, that this will be granted.

Our plan for introducing dairying in a district necessitates arousing favorable sentiment. It is necessary to interest the business men so that they will advance the capital to enable the farmers to take up the work.

As a first step, we call a meeting of the bankers and merchants, including representatives from the Commercial Club, and explain to them the benefits to be derived from dairying properly conducted. Our argument is that good business in the town is dependent upon the prosperity of the farming region surrounding it.

Then a second meeting is held to which the farmers are invited. When a sufficient number become interested to justify the purchase of a carload of cows, we are ready to go ahead.

We furnish an expert from our department, and the farmers and bankers select a man, and the two go to some dairy district where high-grade cows can be purchased under favorable circumstances.

Our man subjects them to a tuberculin test, and also advises the representative of the farmers and bankers, as to the true value of the prospective purchase.

It is stipulated that the animals shall be delivered to the communities and sold at exact cost, plus the freight and necessary expenses; as we could not afford to become involved in a transaction that has for its object private gain. As a precautionary measure, we insist on duplicate receipts being furnished by the dealer.

After the cows are placed, our expert is instructed to remain over night with the farmer and to get up in the morning with him and help him feed and milk the new stock. He advises the farmer as to proper feeding methods, sanitary measures, and how to market the milk most profitably.

We keep posted by a follow-up system. Our representative repeats his visit to see that his instructions have been fully understood and that all is working well with the farmer and his new cows.

The Business Men's Dairy Extension Movement includes in its membership: creamery separator, creamery package, and machinery men, silo manufacturers, and allied interests to be benefited by an increase of the dairy business.

The Board of Directors of this organization is representative of these interests, and is as follows:

H. C. Beckman of the DeLaval Separator Company, for the machinery interests; G. A. Chapman of the Quaker Oats Company, for the stock feed interests; W. W. Marple of the Fox River Butter Company, and E. K. Slater of the Blue Valley Creamery Company, for the creamery interests; W. E. Skinner, Secretary of the National Dairy Council, for the dairy interests.

The late Dr. H. B. Favill, President of the National Dairy Council, was also a member of the Board, representing the dairy interests.

A fund of \$10,000 has been raised and more pledges are coming in. All expenditures of this organization for dairy promotion work are authorized by the members of this Board.

The active work of the bankers is accomplished through the Dairy Committee, created for this purpose, of which John M. Crebs of Carmi, Ill., is chairman. He is also doing splendid work and is devoting his best efforts to the work.

As for results, I am pleased to say we have made important progress and we have a very encouraging future.

We have held a number of successful Dairy Day celebrations characterized by enthusiasm and attended by thousands of persons. The celebrations at Carbondale and Harrisburg were marked examples along this line.

Sixty carloads of high-grade milk cows have been placed with farmers in Illinois, and we now have orders for 18 carloads more; about 30 bulls have been allotted to communities by the New York Central Lines, and the Illinois Central railroad; five calf clubs for children have been organized by the banks and more are in the process of formation, and authorities in many counties have endorsed our plan for model dairies on the County Poor Farms.

I shall be glad to enlighten you on any particular phase of the situation and will furnish additional details if you so desire.

With best of wishes, I am

W. SCOTT MATTHEWS,
Commissioner.

TREASURER'S AND SECRETARY'S REPORTS.

Chicago, Ill., July 10, 1916.

Report of Secretary and Treasurer Illinois State Dairymen's Association for the year July 1, 1915-July 1, 1916.

Secretary's Report of Receipts and Expenses Exclusive of the \$2,500 Appropriation from the State.

RECEIPTS

Check from Treasurer	\$ 15.45
Check from Treasurer	50.00
Check from Treasurer	109.58
Diamond Crystal Salt Co.	10.00
Chr. Hansen's Laboratory	10.00
Colonial Salt Co.	10.00
International Harvester Co.	10.00
Blanke Mfg. Co.	5.00
J. B. Ford Co.	10.00
Worcester Salt Co.	10.00
DeLaval Separator Co.	35.00
Fox River Butter Co.	5.00
J. G. Cherry Co.	10.00
Elgin Butter Tub Co.	10.00
Sturges & Burn Mfg. Co.	5.00
B. Riley Hawk Supply Co.	5.00
Creamery Pkg. Mfg. Co.	25.00
Wells & Richardson Co.	10.00
Memberships	168.00
Salary of Secretary	300.00

\$813.03

EXPENSES

Express and Cartage	\$ 8.67
Telephone and Telegrams	4.15
Railroad Fare (Stenographer)	16.28
Hotel Roberts, Carbondale	38.94
Traveling	115.61
Treasurer Foss	235.32
Mailing Reports	31.28
Stamps	42.33
Printing	2.25
Stenographic Work	10.00
Labor (Carbondale)	6.25
Exchange20
Miscellaneous	1.75
Salary of Secretary	300.00
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Total	\$813.03

GEO. CAVEN, Sec.

Approved:

J. B. NEWMAN,

Aug. 12, 1916.

Auditor.

ANNUAL REPORT

TREASURER'S REPORT FOR YEAR ENDING, JULY 1, 1916.

RECEIPTS

July 1st, 1915—Balance on hand	\$ 822.24
Aug. 28th, 1915—From Geo. Caven for State ap- propriation	2,500.00
Jan. 15th, 1916—From Geo. Caven	30.00
Feb. 25th, 1916—From Geo. Caven	135.50
April 1st, 1916—From Geo. Caven	48.00
April 14th, 1916—From Geo. Caven	10.00
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\$3,545.74	

DISBURSEMENTS

1915	Voucher No.	Amount
Feb. 27—Gus Becker, Premium Butter, Peoria..	177	\$ 7.00
May 18—H. W. Elson, Cattle Feed at Peoria...	214	8.95
Sept. 30—H. J. Credicott, Meeting Directors, Springfield	219	17.49
Sept. 30—Lewis N. Wiggins, Booth at State Fair	220	36.03
Sept. 30—J. R. Newberry, Meeting of Directors, Springfield	221	7.45
Sept. 30—C. H. Stein, Meeting of Directors, Springfield	222	25.00
Sept. 30—Rapid Engraving Co., Half-Tones for Report	223	7.56
Sept. 30—Geo. Caven, Directors' Meeting, Spring- field, \$13.35; to Elgin Account Report, \$2.10	224	15.45
Nov. 24—Geo. Caven, Mailing Annual Reports..	225	50.00
Nov. 24—J. R. Newton, Expense to Carbondale..	226	20.25
Dec. 9—E. T. Ebersol, Expense Meetings at Worden and Marine	227	10.14
Dec. 9—Chicago Produce Company, Printing Let- ter Heads, Envelopes, News Notices	228	9.95
Dec. 9—Geo. Caven, One-half salary as Sec. '15-'16	229	150.00
1916		
Jan. 12—J. R. Newberry, Expenses West Liberty, Bone Gap and Hidalgo	230	6.05
Jan. 12—Chicago Produce Company, Printing..	231	9.50
Jan. 12—H. P. Irish, Expense West Liberty, Bone Gap and Hidalgo	232	8.68
Jan. 12—C. H. Stein, Expense West Liberty, Bone Gap and Hidalgo	233	10.00
Jan. 12—E. T. Ebersol, Expense West Liberty, Bone Gap and Hidalgo	234	9.20
Jan. 12—J. P. Mason, Expense one day meet- ings	235	45.38

1916	Voucher No.	Amount
Jan. 27—Carbondale Printing Co., charges for Programs	236	23.25
Jan. 28—R. A. Given, Stenographic Work	237	20.00
Jan. 28—H. C. Horneman, Expenses meetings Shelbyville, Assumption, Ramsey, Mt. Vernon	238	23.81
Feb. 2—F. P. Collyer, Judge of Butter at Carbondale	239	34.95
Feb. 5—The Elgin Dairy Report, Programs, Carbondale Convention	240	57.75
Feb. 2—Chicago Produce Co., Printing and Telephone	241	8.75
Feb. 2—The Greenduck Company, 350 Badges, Carbondale Convention	242	75.60
Feb. 2—American Association Creamery Butter Manufacturers, Services F. W. Bouska at Carbondale	243	20.08
Feb. 2—M. Mortensen, Expense Carbondale Convention	244	35.16
Feb. 2—Chas. Foss, Expenses Carbondale Convention	245	26.70
Feb. 2—E. T. Ebersol, Judge at Carbondale Convention	246	15.20
Feb. 2—J. R. Newberry, Expense Carbondale Convention	247	8.03
Feb. 5—H. P. Irish, Expense four One-Day meetings and Carbondale Convention	248	30.37
Feb. 5—C. G. Hopkins, Expense Carbondale Convention	249	8.75
Feb. 18—Lowrie & Black, Printing 3,000 Annual Reports	250	562.50
Feb. 18—N. W. Hepburn, Expense Carbondale Convention	251	20.97
Feb. 18—R. S. Hulce, Expense Carbondale Convention	252	11.50
Feb. 18—T. A. Borman, Expense Carbondale Convention	253	22.13

1916	Voucher No.	Amount
Feb. 18—H. J. Credicott, Expense Carbondale Convention	254	29.00
Feb. 18—W. W. Marple, Expense Carbondale Convention	255	20.28
March 3—J. P. Mason, Attending meetings at Shipman, Moro, Bunker Hill, Weldon and others	256	76.16
March 3—A. J. Spohn, Butter Premium, Carbondale	257	10.00
March 3—F. J. Weddige, Butter Premium, Carbondale	258	2.50
March 3—Peoria Creamery Co., Premium Butter, Carbondale	259	3.00
March 3—Richmond Bros., Butter Premium, Carbondale	260	4.00
March 3—United Dairy Co., Butter Premium, Carbondale	261	3.50
March 3—Sanitary Creamery Co., Butter Premium, Carbondale	263	5.50
March 3—Peter J. Petersen, Butter Premium, Carbondale	264	4.50
March 3—A. M. Kleinhofer, Butter Premium, Carbondale	265	5.00
March 3—J. W. Bilderbach, Butter Premium, \$5.50; Second Holstein Grade, \$5.00	266	10.50
March 3—Mrs. S. J. Schwartz, Butter Premium, Carbondale	267	4.50
March 3—Mrs. H. G. Easterly, Butter Premium, Carbondale	268	4.00
March 3—Mrs. E. E. Kimmell, Butter Premium, Carbondale	269	3.00
March 3—Chas. Foss, Butter Premium, Carbondale	270	2.75
March 3—F. B. Miller, Butter Premium, Carbondale	271	2.50
March 3—Mrs. James Hanna, Butter Premium, Carbondale	272	2.75

1916	Voucher No.	Amount
March 3—H. C. Peck, Butter Premium	273	4.00
March 3—W. J. Bryan, First Jersey Grade, \$10.00; First Holstein Grade, \$10.00; Carbondale ..	274	20.00
March 3—W. G. Robinson, First and Second Jersey Registered, \$15.00; Second Jersey Grade, \$5.00	275	20.00
March 3—Grant Parrish, First Holstein Regis- tered	276	10.00
March 3—J. R. Newberry, First Butter Judging Contest, Carbondale	277	10.00
March 3—F. A. Jorgensen, Second Butter Judg- ing Contest, Carbondale	278	8.00
March 3—L. T. Potter, Third Butter Judging Contest, Carbondale	279	6.00
March 3—H. C. Peck, Sweepstakes Corn, \$15.00; First White Corn, \$10.00; Second Yellow Corn, \$7.00	280	32.00
March 3—S. M. Ripley, Second White Corn, Car- bondale	281	7.00
March 3—E. S. Helms, Third White Corn, Car- bondale	282	5.00
March 3—R. O. Stearns, Fourth White Corn, \$2.00; Fourth Yellow Corn, \$2.00, Carbon- dale	283	4.00
March 3—Edw. Stearns, Fifth White Corn, \$1.00; Third Yellow Corn, \$5.00, Carbondale	284	6.00
March 3—W. J. Ropp, First Yellow Corn, Car- bondale	285	10.00
March 3—E. J. Petery Fifth Yellow Corn, Car- bondale	286	1.00
March 4—E. T. Ebersol, Expense meeting Wash- ington, El Paso and Farmington	287	12.41
March 4—R. S. Hulce, Expense Meeting Mason City, Kenney and Washington	288	14.84
March 4—H. P. Irish Expense Meetings Farming- ton, Mason City, Kenney and El Paso	290	30.00

1916	Voucher No.	Amount
March 13—S. B. Shilling, Expense Meeting Grant Park	291	13.00
March 13—W.T. Crandall, Expense Meeting Harrisburg	292	12.59
March 13—Geo. Caven, Second Half Salary as Secretary, 1915-1916	293	150.00
March 22—F. G. Austin, Expense Carbondale Convention	293	7.86
March 16—Mrs. Marguerite Schultz, Reporting Carbondale Convention, \$75.00; Expense, \$5.00	294	80.00
March 22—H. P. Irish, Expense Harrisburg, Litchfield and Mt. Olive	294	24.47
March 16—H. C. Horneman, Expense Shelbyville Meeting	295	10.09
March 22—E. T. Ebersol, Expense Metamora, Morton and Shelbyville	295	11.15
March 16—Sidney B. Smith, Expense Carbondale, Litchfield, Mt. Olive, Metamora, Morton and Shelbyville	296	40.69
March 17—W. T. Crandall, Expense Grant Park and Morton Meetings	297	12.39
April 13—Alexandria Farms Dairy, First Prize Milk, Carbondale Convention	301	5.00
April 13—Trimble Bros., Second Prize Milk, Carbondale Convention	302	4.00
April 13—Mrs. John Boucher, Third Prize Milk, Carbondale Convention	303	3.00
April 13—W. E. Phifer, Fourth Prize Milk, Carbondale Convention	304	2.00
April 13—Harry H. Etherton, Fifth Prize Milk, Carbondale Convention	305	1.00
April 13—Lewis N. Wiggins Expense Judge Cattle, Carbondale Convention	306	18.35
April 13—Chicago Produce Co., Printing and Telephone Charges	307	4.00

1916	Voucher No.	Amount
April 13—Lowrie & Black, Envelopes and Printing, Freight and Expense on Reports.....	308	8.23
April 13—C. H. Stein, Expense, Carbondale Convention	309	10.00
April 16—J. P. Mason, Expense Carbondale, Lincoln, Washington and El Paso	310	44.70
April 16—Sidney B. Smith, Expense, Carbondale, April 1st	311	12.07
April 16—J. P. Mason, Expense, Litchfield, Mt. Olive and Shelbyville	312	38.56
May 25—Geo. Caven, Expense General Dairy Meeting at Washington, D. C., May 5th and 6th, and Meeting of U. S. Milk Standard Committee, New York, May 9, 1916	313	109.58
May 25—H. C. Horneman, Expense Carbondale Meeting, April 1, 1916	314	17.00
May 25—Chicago Produce Co., Printing	315	3.65
June 30—Lowrie & Black, Cartage and Freight on Reports	316	3.17
June 30—Chicago Produce Co., Half-Tones 1916 Report	317	15.65
June 30—Chicago Produce Co., Letter Heads and Envelopes	318	6.13
June 30—Kimball's Dairy Farmer, Subscription Prizes	319	1.50
Total		\$2,523.12
Total Cash received for year to July 1, 1916		\$3,545.74
Total Disbursements for year to July 1, 1916		\$2,523.12

Balance on hand July 1st, 1916\$1,022.62

Respectfully submitted,

CHAS. FOSS, Treasurer.

Approved Aug. 12, 1916.

J. B. NEWMAN, Auditor.

**SPECIAL DAIRY MEETING MAY 5 AND 6, 1916, IN
WASHINGTON, D. C., CALLED BY SECRETARY
OF NATIONAL DAIRY UNION.**

(Report by Representative of Illinois State Dairymen's Association.)

Illinois State Dairymen's Association:

Permit me to submit herewith report of my trip to Cincinnati, Washington and New York City, where, as per your instructions, I represented the Illinois State Dairymen's Association on matters up for discussion at these three places.

Arrived at Cincinnati Wednesday, May 3, and attended the meeting of the Ohio State Creamerymen's Association, with J. B. Newman, a director of our Association and Assistant State Food Commissioner. Mr. Newman was on the program to address them on the work of the State Dairymen's Association on matters of creamery sanitation and the correction of oleomargarine abuses. They were very much interested in the attitude of the Illinois State Dairymen's Association regarding pasteurization of dairy products, and the co-operation between the State Dairymen's Association, creamerymen, and the Food and Dairy department. They were very much surprised and pleased at the progressive stand taken by our Dairymen's Association. They were also very much interested in our efforts for cream grading. In fact they were so much interested they asked if Mr. Newman would not meet with them again and give them another talk, which he promised to do. We found that the work of the Association had spread beyond the borders of our state very much to the credit of the Association.

We left Cincinnati Wednesday afternoon, arriving in Washington Thursday morning, in company with Hon. W. B. Barney, Dairy and Food Commissioner of Iowa and President of the American Association of Dairy, Food and Drug Officials:

also the Hon. J. J. Farrell, Dairy and Food Commissioner of Minnesota. After registering at the Harrington Hotel, we proceeded to the Agricultural Buildings, Bureau of Animal Industry, where we had been invited by A. D. Melvin to attend a conference and hear the unpublished details of the sanitary condition of creameries and cream buying stations and the condition of the cream delivered at such plants, part of which was published in the U. S. Agricultural Department report of 1912, and was the basis of very unjust criticism by various institutions and people antagonistic to the dairy industry. There was a very large gathering present composed of the owners and operators of large creameries of the country, professors from agricultural and dairy colleges, representatives of the dairy press, and dairy and food officials; Mr. S. B. Shilling, representing the Chicago Dairy Produce; B. D. White of the Milk News; John Crump of the Dairy Record; Mr. Johnson, representing the Beatrice Creamery Co. and Fox River Butter Co.; J. A. Walker representing the Blue Valley Creamery Co.; J. R. Morley, representing the Minnesota Co-operative Dairies Association, and there were other creamerymen present. Professor McKay represented the American Association of Creameries; Prof. Frandzen of Nebraska University; Professor E. H. Farrington was there from the University of Wisconsin; Professor Curtis from Iowa State College; Professor Harding of University of Illinois, and others from neighboring dairy and agricultural colleges. The Dairy and Food Departments were represented by Commissioner Stadtmueller of Connecticut; Commissioner Purcell of Virginia; Commissioner Bennett of Missouri; Commissioner Barney of Iowa. Commissioner Farrell of Minnesota; Klein of Kansas; Newman from Illinois; Mr. Flanders representing New York came in later; the National Dairy Union was represented by President Hull and Secretary Creasy. The Dairy Council was represented by President Mund, Secretary Skinner and some of the directors. Mr. Credicott of Freeport was there representing the Illinois Creamerymen and as a director of the National Dairy Union. Mr. Sharpless of Pennsylvania was there representing

the Pennsylvania Creameries; and there were members of the National Grange present. There was a large gathering of people representing the various phases of the dairy industry and men who were well posted and competent to reflect dairy conditions. The meeting was called to order by Assistant Secretary of Agriculture Carl L. Vrooman, who made a statement that as so much publicity had been given the report of 1912, some of the publicity unwarranted and unfair in so far as the department was concerned, it had come to his attention that it had created considerable stir, and he wanted the industry to meet, talk matters over, hear the unpublished part of the report, see some stereopticon slides, have a full, free and frank discussion not only of the report but of matters in general pertaining to the betterment of creamery sanitation and creamery butter.

Secretary Vrooman was followed by Dr. Melvin, Chief of the Bureau of Animal Industry, who practically reiterated what the secretary said. Dr. Melvin was followed by Chief Rawl of the Dairy Division. Chief Rawl said that the department had started out in August of 1912 to make a survey of creameries and cream buying stations; that two inspectors were assigned to the work, Inspectors White and Sandholtz, and the field covered was the nine central dairy states, names of cleanliness not given. Following are the questions asked by inspectors on which the objectionable 1912 report is based:

Question 1. Are surroundings free from contaminating influences?

Surroundings were considered contaminating when poultry houses, barns, hog pens, manure or refuse were found close to the place in which dairy products were handled.

Question 2. Are buildings provided with suitable and sufficient drainage?

Was answered "No" when the drains were not properly trapped, the drainage permitted to run upon the surface of the ground close to the creamery, or where running water was not available and the waste water was carried out in pails.

Question 3. Is suitable ventilation provided for carrying off steam and objectionable odors quickly?

Ventilation was considered not suitable when walls were wet from steam, when the room was not provided with windows or doors that permitted a circulation of air, when the only ventilation obtainable was through other rooms such as a grocery store, butcher shop, general store, etc., and when there was a close and objectionable odor in the room.

Question 4. Are floors made of suitable material and free from broken or decayed portions?

Floors were considered unsuitable when made of unsound, decayed or rough material and when they were so constructed that they could not readily be cleaned.

Question 5. Are walls, partitions, platforms, and stairways kept clean and painted?

This question was answered "No" when these places were not properly cleaned and painted.

Question 6. Are doors and windows clean and is sufficient light provided?

Light was considered insufficient when it would not permit of accurate work being carried on in all parts of the room.

Question 7. Are provisions made to protect the building and products from flies?

This question was answered "No" when screens were not provided or when they were broken.

Question 8. Are walks kept clean to prevent dirt from being tracked into building?

Was answered "No" when no walks were provided or where walks were not kept clean.

Question 9. Are utensils properly and thoroughly cleaned and sterilized?

Was answered "No" when utensils were not entirely free from organic matter and were not heated to a sterilizing temperature at the end of each day's work.

Question 10. Are pumps and pipes of sanitary type and taken apart after use each day?

Was answered "No" when pumps and pipes were not well tinned and smooth, easily taken apart, entirely free from organic

matter and were not heated to a sterilizing temperature at the end of each day's work.

Question 11. Do the employees wear clean clothes?

Was answered "No" only when the clothing was very objectionable. In a large percentage of creameries and cream buying stations the operator and employees make no effort to wear clean clothing when handling dairy products. Special clothing that may be easily laundered is seldom worn. This practice is undesirable from a sanitary point of view.

Question 12. Is there any suspicion that employees are affected with tuberculosis or other communicable disease?

Was answered "Yes" only when the disease was very evident or the employee admitted the disease.

Question 13. Are toilet and dressing rooms provided separate from the rooms where butter and other dairy products are handled.

Was answered "No" in cases where no such room was provided as well as in cases where the rooms were provided but were not separated from rooms in which dairy products were handled. The absence of dressing and toilet rooms may not be a badly contaminating influence, but their presence is a great aid in maintaining the sanitary conditions of the place and the employees.

A score card was drawn up as follows: Chief Rawl said he had arranged an illustrated lecture to show by slides the questions and answers, or rather the conditions noted by the inspectors. These questions as you will notice were answered practically by yes and no. The inspection covered 147 creameries and 249 cream-buying stations, whereas in the United States there are 6,000 creameries and 40,000 cream-buying stations. Inspection ran from August of 1912 to May 1913. It was admitted that neither the department nor these inspectors had at any time called upon, consulted with or advised in any manner the dairy and food commissioners of these respective states. It was shown by the slides that they considered all cream a second grade cream that had over .2 of 1% of acid, when it is a known fact that most cream is held not churned until it develops .6 of 1% acid.

There was no effort as you will see by the score card to consider certain things as major offenses and others as minor offenses. The minor offenses were given as much weight as the more important offenses.

After showing the charts the guests were invited to partake of a dairy luncheon provided by the Dairy Union. After partaking of the luncheon, which was an elaborate display of dairy products, very appetizing, we convened to see a demonstration of an economical small apparatus that graduates steam for the purpose of sterilizing dairy utensils. The demonstration was very satisfactory and they deserve great credit for working out a small and economical apparatus of this kind that will allow the farmer to thoroughly steam sterilize his utensils at very small cost.

We reassembled in the lecture room and the general discussion of the report, score card, etc., took place. Those giving talks and entering into the discussion were Professor McKay, Commissioners Farrell, Barney, Stadtmueller, Purcell, Klein and Newman.

John B. Newman, as Assistant Dairy and Food Commissioner of Illinois, familiar with dairy conditions, director of the State Dairymen's Association and familiar with the work of the Illinois Butter Manufacturers' Association, said in part as follows:

"That we were amazed, that we were astounded in Illinois when we were made aware of the statement in the department's report of 1912 in so far as it related to the inspection of creameries and the results as found according to their deductions. We were amazed and surprised, first, that the Illinois Dairy and Food Department had not been consulted, had not been asked to co-operate and had been given no report of the findings—first, that we might remedy them, if they were so; second, that we could advise the department, if they were not so; and third, in any event we might co-operate. A Dairy and Food Department having for enforcement a sanitary law as well as a food law, we were able to know exactly the conditions of creameries in Illinois. We had gathered together just before we started a

detailed report of the inspectors' inspecting creameries for the previous week which was the week of April 24 to 29, and of the 32 creameries inspected that week, the average score from a sanitary standpoint was 76.9%."

He criticized severely their score cards of the dairy division and said no man was competent to reflect back to his superiors or to anybody else the condition of creameries with a score card of that kind. For instance, a man was scored off just as much if the sidewalk outside of his creamery was dirty (even though there was a door mat at the door and a sign to wipe your feet, and it was complied with) as he was if he had a dirty, unsanitary pump, or pipes, or churn. He called their attention to the fact that the Illinois score card was based on major criticisms given more weight than minor criticisms. That a creamery scoring 90 and over was rated excellent; 80 and up to 90, good; 70 and up to 80, fair; 60 and up to 70, poor, and under 60, bad. That if an inspector found a creamery scoring under 70, in the class of poor, instructions were given to the owner or operator what he should do to correct conditions, and time limit set depending upon the character of the correction; that the inspector returned after the time limit and if the creamery had corrected conditions, putting itself into class of fair or 70, or better, all right; if not, they were recommended for prosecution. That a creamery that scored under 60, in the class of bad, the inspector staid right on the ground, and gave instructions that would get them up into the grade of 70 and did not leave until they had corrected conditions to such an extent. If they didn't show a willingness to comply, the product was tagged as suspected, and they were recommended for immediate prosecution. And that, as I said before, the results of the previous week's inspection shows the average condition to be close to good, as it was 76.9%, one creamery only scoring bad or below 60.

"Contrast this actual inspection with the results found by the department in 1912," said Mr. Newman. "They admitted, and I will admit also, that some correction has taken place since 1912, but as the report of 1912 was published without any statement that there was a correction by this time, and when they

gave the report out to Congressman Linthicum and others they did so unqualified by any statement that it did not reflect conditions on behalf of the State of Illinois. We resented the inference that it did reflect conditions in Illinois, and had the actual proof. We told them that we were surprised and amazed that this dairy division, as the parent division in creamery sanitation and upbuilding should come into a dairy state without calling up the Dairy Commissioner, without offering to or asking for co-operation, make an inspection of conditions, file a report at Washington without giving us any hint of their ideas of conditions. After the report was compiled it was printed without sending us a copy or calling our attention to it. That is not co-operation in any sense of the word. Had the inspectors for the Dairy Division come to the Food and Dairy Department of Illinois we would have been glad first to have called their attention to what we considered our poorest creameries, recommended that they be the ones inspected; would have sent one or two inspectors with them—I would have been glad to have gone myself; and with the Federal and State Departments co-operating we not only would have made an impression upon these poorer creameries, but they would have been acquainted with our ideas of sanitation and we with theirs. I am satisfied had they done this in any state, not alone our state, that before they had gone very far they would have been convinced that they were working on an entirely inadequate card for the purpose for which they were in the field. If there had been any good points in their card, we would have been glad to have copied them, and they would have been just as willing to copy the good points in our card.

“I have been unable as yet to find any possible excuse for this failure not only to co-operate at first, but to refuse to submit to our state department a report of the creameries in Illinois that they inspected, if they did inspect any Illinois creameries. I assume that they did because we consider ourselves one of the nine central dairy states.

Mr. Newman assured them that the Illinois Food Department had not been asleep, and told them of what we were doing here in the way of sanitation; told them the stand of the Illinois

State Dairymen's Association on pasteurization of dairy products and the co-operation it was giving the Food Department and the Illinois Butter Manufacturers' Improvement Association, and how the three were working together. He drew to their attention how by actual reports we knew that over 97½% of creamery butter made in Illinois is from pasteurized cream, and about 2½% from unpasteurized cream, and that this 2½% was made in small creameries, the product of which was eaten in the local communities; that there was less than 1% of Illinois creamery butter that left the borders of the State for interstate shipment that was made from unpasteurized cream. That was received with a great deal of favor by the audience and I think by the department itself, and I am proud of that record and I know your association is, and I am proud of the fact that by the co-operation of your association and the butter makers, we are able to prove up such a record and that our efforts will not cease until we get practically all of our Illinois creamery butter made from pasteurized cream."

After the meeting broke up Mr. Newman met with the committee on resolutions to get up a statement by the Bureau of Animal Industry that will in part correct the erroneous impression that had been sent out to the American consumers, or consumers of America's butter, and that the department would issue a statement that they regretted that the report inaccurately reflected the conditions found by the inspectors and that the word "insanitary" to a greater or less degree was unfairly used, and that the per cent that they stated of cream as being unwholesome was wrong in their estimation, and that the per cent of unsanitary creameries and industries on that report was also much too high. It was evidenced by those present that everybody was satisfied that the deductions in the department report were very much in error. A statement was submitted to Chief Rawl, who said he would have to take it up with his superior, Dr. Melvin, as to what kind of a statement they would get out. Saturday he reported back that Secretary Vrooman wished a copy of a resolution, etc., to guide them in getting up a statement. Mr. Newman offered the following resolution which was adopted:

"That for the information of the consumers of American butter, who had much false information given them through the press, further by designing or erroneously informed persons, that after this gathering of information that the facts are that much the larger per cent of creamery butter is made from pasteurized cream, and we recommend pasteurization of cream to all others."

It was evident that everybody there was in favor of pasteurization. The department report seems to indicate that the majority of butter was made from unpasteurized cream. The facts are to the contrary.

The following resolutions passed at the general meeting give the results of the gathering; and the address by Secretary Creasy of the National Dairy Union, given at the opening of the meeting explains fully the purpose for which this great gathering of representatives of dairying was held:

THE RESOLUTIONS

WHEREAS, In the Year Book of the Department of Agriculture for 1912 appeared a report on the dairy and creamery industry of the United States, based on an inspection of only 144 creameries and dairies among the thousands in this country; and

WHEREAS, Unwarranted and untrue inferences have been drawn from such report by the consumers of American butter, and the information therein presented has been unfairly used by interests hostile to the dairy industry to damage it immeasurably;

RESOLVED, That the facts are thus made matter of record and that report declared woefully incomplete in its survey and wholly false in its conclusions;

RESOLVED, That its publication was all the more reprehensible because for many years constant progress has been made in pasteurization and in general improvement in handling cream and in the manufacture of creamery butter, until today much the larger percentage of American creamery butter is made from pasteurized cream;

RESOLVED, That we approve and recommend general pasteurization of all creamery butter.

Diseases of Cattle.

WHEREAS, Contagious abortion among the dairy herds of this country is a very serious menace to the profitable production of milk, exceeding in its economic destructive character any of the other diseases to which dairy cattle are subject,

RESOLVED, That the Department of Agriculture is hereby urged to give attention, in the most persistent and comprehensive fashion possible, independently and in co-operation with the State experiment stations, to this disease, with a view toward controlling it and lessening its ravages. We request that the best qualified investigators be assigned to this exclusive task. In view of the tremendous economic importance of this problem, we request that it be approached at once from every possible hopeful angle.

WHEREAS, The presence of tuberculosis in cattle is a menace to the profit of the breeder and the dairy farmer; and

WHEREAS, Its presence in the herd can as a rule be detected by the application of the tuberculin test by men skilled in its use and when administered under proper conditions;

RESOLVED, That this convention urges breeders and handlers of all classes of dairy cattle to weed out reactors from their herds as a matter of protection to their own financial interests, either consigning them to the butcher or segregating them in the herd, when they are of sufficient value to warrant such manner of handling;

RESOLVED, That this convention heartily endorses the State-accredited herd plan of inducing breeders voluntarily to offer their herds for official test and secure a certificate which will accredit their cattle to any State without re-test;

RESOLVED, That reasonable compensation should be allowed by Federal and State authorities for all animals slaughtered in the eradication of tuberculosis. This compensation should not be arbitrarily limited by statute, but should be fixed by ap-

praisal in each case, or by court decision on proof of the value of the slaughtered animals.

WHEREAS, The Act of Congress, May 29, 1884, created the Bureau of Animal Industry, specifically "to prevent the exportation of diseased cattle and to provide means for the suppression and extirpation of pleuropneumonia and other contagious diseases among domestic animals;" and

WHEREAS, By Executive Act the activities of this Bureau have gradually been broadened to include various lines concerned with the breeding and feeding of live stock and the manufacture and distribution of dairy products; therefore

RESOLVED, That the Conference of Dairy Interests, held in Washington, May 5-6, 1916, earnestly urges the Secretary of Agriculture to partition the present work of the Bureau of Animal Industry among three separate bureaus or offices, one concerned specifically and exclusively with animal diseases and to be called the bureau or office of Animal Health; one concerned with the encouragement of the breeds of live stock and the improvement of the utility stock on the farm other than dairy cattle, and one concerned specifically with dairy cattle and the dairy industry.

RESOLVED, That the Secretary of Agriculture be urged to form the heads of these three bureaus or offices into a Federal Live Stock Board, which shall administer all live stock regulations, under direction of the Secretary of Agriculture.

RESOLVED, That the Secretary of Agriculture be also urged to request from Congress another Assistant Secretary of Agriculture, to whom the heads of these three bureaus or offices shall be responsible.

Uniform Milk Regulations.

WHEREAS, At the present time the regulations under which the milk supply of the country is produced are promulgated by the health boards of states and cities and are subject to more or less change under different administrations of the health bureaus, thereby causing dissatisfaction between the producers and the health officers, and placing unnecessary burdens

of expense upon the producers in changing buildings to conform to carrying requirements;

RESOLVED, That we call upon the Secretary of Agriculture to appoint a committee consisting of two milk producers, one milk dealer and two sanitarians, known to be identified with, milk production methods in advanced form, to frame a set of rules and regulations covering milk production, which shall embrace methods to be used in the care and handling of cattle, shall describe methods that insure cleanliness of cow and milker, shall set forth treatment of milk from udder to delivery, shall outline barn construction and cleanliness of barns all with due regard to keeping cost at the level of the means of the average producer.

RESOLVED, That when a report from such committee shall have been approved by the Secretary of Agriculture, he is requested to use his good offices to have such report adopted by the states and cities of the United States.

WHEREAS, The use of foreign fats in the production of dairy products of all kinds constitutes a fraud upon the dairyman and the ultimate consumer as well,

RESOLVED, That it is the sense of this conference that all products so made should be so marked as to disclose the materials used in their manufacture.

Closer Union Urged.

WHEREAS, The outstanding benefit derived from co-operative effort of agricultural interests has been demonstrated by this conference;

RESOLVED, That the different branches of these allied industries be urged to consider a closer union in co-operative legislative effort.

Denatured Alcohol.

WHEREAS, The subject of denatured alcohol has always been considered as referring to the conservation of waste products; and

WHEREAS, We believe that it is a feeding proposition enabling the dairy farms to extract the fuel needed for con-

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sumption in the machinery and lighting of the farm and at the same time to furnish from his own fields a more nearly balanced ration; and

WHEREAS, The necessary experimentation for determining the cost of production and the kind of process and machinery suitable to this development will require expensive research;

WHEREFORE RESOLVED, That this conference of Dairy Interests calls the attention of Congress to this great field of conservation and approve legislation that will make possible the necessary experimentation.

Higher Rates on Milk.

WHEREAS, The railroads of New England are now before the Interstate Commerce Commission asking for an increase in rates upon the transportation of milk and cream; and

WHEREAS, It has been shown by testimony under oath that any increase in transportation will be reflected in the price paid to producers for milk and cream; and

WHEREAS, It has been shown by equally creditable testimony that the farmers are receiving less for milk and cream than it costs to produce it; and

WHEREAS, The dairy industry of New England has declined rapidly, as evidenced by the disappearance of many creameries, large numbers of cows and, in certain localities, the abandonment of the dairy business; and

WHEREAS, An increase in transportation rates in New England may work as an opening wedge in effecting an increase of such rates throughout the country,

RESOLVED, That this conference of Dairy Interests tender its sympathy to the farmers of New England in their fight against such increase in transportation rates, and respectfully asks that the Interstate Commerce Commission give careful consideration to the rights and equities of the farmers, to the end that dairying may not be handicapped by transportation rates or systems impossible for the producer to bear.

Mr. Creasy's Address.

Wm. T. Creasy, secretary of the National Dairy Union, had called the meeting, and in an address explained its objects. Mr. Creasy said:

Gentlemen: The purpose of this meeting is to outline a constructive program for developing practical uniform regulations governing the production and care of dairy products.

It is my duty as temporary chairman of this convention to explain how the issue of the call for this meeting came about. Representatives of the dairy interests, members of the Grange, and officials of the Department of Agriculture met to discuss a bill before Congress covering the matter of interstate shipments of milk and cream. The bill was found to be far-reaching in its effects, and it was the opinion of those at the conference that the bill could be made a basis for national, state and city regulation that would result in bringing about uniform regulations regarding the production of milk and other dairy products from the cow to the consumer. Added to this was the multitude of regulations differing so much that the producer on the one hand was very much dissatisfied, believing that, since they differed so widely, they could not all be correct, and at the same time receiving little or no pay for additional regulations that were as often changed as new officers or inspectors assumed authority in city governments. The consumer on the other hand was complaining that he was paying a high price for necessary articles of diet, which were being criticized as to their purity and wholesomeness, and was also meeting antagonism and unwarranted attacks by other industries, upon this industry which brings to the producers of dairy products of this country a billion dollars a year. To this was added the unremunerativeness of the business, together with the questions of legislation in Congress as well as in the different states, relating to the important changes that are being agitated by those favoring the industry, and by those antagonistic to it. Taking these matters, with many others not mentioned, into consideration, it was thought by those parties in close touch with affairs that the dairy interests of this country should be brought together in convention in this city to

discuss questions relating to the future development of this great industry. I say, this great industry, because on nearly 81% of the farms of this country, according to the census of 1910 there were about 22,000,000 dairy cows. In other words, on nearly $5\frac{1}{4}$ million farms in this nation dairying is carried on to a greater or less extent. The same census report shows that the value of the dairy products not including the milk and cream consumed on the farm, amounted to seven hundred million dollars, which if included with the increase up to the present time it would be safe to say that the business means to the agriculture of this country over a billion dollars.

This is only part of the story. It is universally conceded that to increase fertility some form of animal industry must be practiced. One of these branches is dairying. It is perhaps the best business educator, because the farmer soon learns whether he is doing business at a profit or loss. It gives employment the year round, and has a wide adaptation of country. It furnishes the most healthful and most nutritious and the cheapest food product known. It has changed great sections of this country from non-profitable farming into a prosperous agriculture.

In one of the great dairy states in the past ten years the average of wheat has decreased 25%, the acreage of corn has increased 73% and the livestock has increased 20%. As I have said, it furnishes work the year round for everyone on the farm, no vacations, and never out of a job.

That all this work is done very cheap can be no better explained than by one who is at the head of the dairy business in one of the great dairy states of the Union and who writes: "The dairyman appreciates that he should receive an income that will pay him a manager's salary as well as the necessary amount to pay running expenses. If it were not, however, for the sale of surplus stock, I fear that the dairy products alone would not enable the farmer to consider his business of dairying a profitable one."

The president of a large corporation, who also farms near a large city, called at our office a few days ago and said he was selling milk at eight cents a quart, that it didn't pay him, and

that he would like me to tell him how it paid the farmer that was selling it for three cents a quart.

The Heart of the Problem.

The question raised by this practical, hard-headed, successful businessman goes to the very heart of the problem at the root of all the farmer's problems. The question of how to make farming of any kind pay, speaking generally, is still unanswered. For the farmer it is the riddle of the sphinx, which not to answer is to be destroyed.

The reason we have never had an answer is that the farmer, the dairyman included, has depended on the other fellow to look after his business for him instead of looking after it himself. You know the story of the lion and the lamb lying down together—how happy, and well fed, and contented the lion was in the morning? That is the story of the farmer, with the farmer playing the part of the lamb.

The remedy is for the farmer to look after his own business, and this conference is evidence that the dairy interests intend to do so. But conventions are only meetings to determine policy, and in the past have been, and in the future will continue to be, powerless to help much, unless, as a result of this meeting, the dairy interests evolve a constructive and permanent program and unite in a federated plan for its fulfillment. This leads me to express myself in favor of a plan for a permanent headquarters in Washington, not only for the dairy interests, but for all agricultural organizations. Such a federation, supervised and directed by broad gauge, sincere men, will do more for the solving of these national agricultural issues than can be done by the present long range method.

This would be welcomed by law-makers. It would present the farmers' views and wishes in a way that could not be mistaken. Not only would it mean a great deal to the dairy interests but it would settle the other great questions affecting agriculture, such as transportation and marketing of farm products, standardization of prices; the maintenance of a proper equilibrium in the production and distribution of farm

products, and other questions vitally affecting the farmers' interests. Such an organization, with the information and help obtainable from our department of Agriculture, would put the business of farming on a basis such as never heretofore has been known in this country.

Farmers must federate in this way if they would have control of their own industries. The signs are multiplying that if they don't, others will do it for them, with the result that the farmer will be the lamb in another lion and lamb story.

The high cost of living has hit the farmer and his "brindle cow" quite as much as his city cousin, by increased cost of feed bills, higher wages, increased freight rates, etc. The gentleman that could not make milk pay at eight cents a quart is living in a city where wages have reached the highest level with short hours and it is getting to be a serious question with dairymen in many sections whether to continue or quit.

Strict But Sane Laws.

Patent cream, that has its good qualities in the purity of the water and the homogenized fats it contains, is sold today in some cities for the genuine article and not for what it is. Further frauds are being perpetrated upon the public by imitating other dairy products at the expense of both the producer and the consumer.

Is it any wonder that dairymen are becoming dissatisfied with the business?

This question, it seems to me, should receive the most earnest and careful consideration, as it will have much to do with the future of the business and may avoid a shortage of milk and its products.

There may be well reasoned-out theories in regard to the amount of butterfat and moisture in dairy products, yet the laws of this country must meet laws of other countries, so that the producers of dairy products are not at a disadvantage in the markets of the world. The dairymen are alive to these problems of providing good, safe, clean dairy products for the consumer, but at the same time they must keep the cost of these

products within bounds and if there is a lot of fuss and folderol in the business that is unnecessary, we should know it.

We should be strict on the essentials necessary to produce wholesome dairy products, but we should not be hampered by foolishness and rules and regulations that are made by those who know little or nothing of the practical side of the great industry, which is at the foundation of a prosperous agriculture.

We have on this program experts who will deal with the leading questions that are now affecting the dairy interests and we hope that we will have the support not only of the consumers of dairy products, but those who are the disseminators of public opinion. We hope to show our appreciation of those who assist us in building up, and our condemnation of those who maliciously tear down.

We believe this convention should work out and fix a standard of sanitary requirements for creameries and cream buying stations, the absolute essentials in one class and the non-essentials to desirable requisites in the second class. We believe also that standardization of sanitary requirements of dairy farms should be outlined in the same way. We believe further that a joint effort should be made by the national and state governments on a basis of reimbursement of those whose cattle are slaughtered for disease and that this convention should express its opinion on the question of pasteurization.

Whether we shall have an expensive federal inspection of creameries which would reach only interstate shipments or whether an adequate state inspection shall be supported or whether it would be wiser to have a modification of both by having the National Department of Agriculture, together with a board of practical experts on dairying approve the work of the respective states if satisfactory, is a question that should be determined by this convention.

THE FEEDING OF DAIRY COWS.

By Helmer Rabild, H. P. Davis and W. K. Brainerd, of the Dairy Division.
United States Department of Agriculture.

Successful feeding of dairy cows from an economic standpoint involves the providing of an abundant supply of palatable, nutritious feed, at the minimum cost per unit of feed, and supplying it to the cow in such way as to secure the largest production for feed consumed. This bulletin will attempt to give some factors involved in the economical selection of feeds and to guide the producer in supplying them to the cows.

Liberal Feeding Necessary For Profit.

The dairy cow has been likened by many writers to a machine or a manufacturing plant. This comparison can be applied literally, with certain reservations. A certain proportion of the power furnished any machine is used for running the machine itself and is not in any sense productive. In a steam engine this is represented in the exhaust steam in heat which escapes without producing steam, and in the friction of the working parts of the engine. In the manufacturing plant it is represented by the managerial, the clerical, and sales forces. These forces, while necessary for the successful operation of the business, are, in a sense, unproductive.

In the feeding of the dairy cow this overhead expense, this unproductive force, is termed the "maintenance ration," and is that portion of the feed given the cow which is used by her to perform her own functions, such as heating the body, pumping the blood, digesting the feed, and moving the body from place to place. This feed, from a productive standpoint, is entirely lost to the farmer. The cow can produce without loss of body weight only after she has exacted this toll of maintenance. Having received feed enough to maintain her, practically all the feed she

consumes above this can be used for milk production. This maintenance ration is a fixed charge, and the more feed a cow can consume above that required for maintenance the greater the amount available for production.

Feeding for profit can, therefore, be defined as liberal feeding, or feeding to the full capacity of the cow. This point is illustrated by Table 1. (These figures are only approximate but will serve to illustrate the point.)

Table 1—Approximate proportions of cows' feed required for maintenance and available for milk production.

Cost of ration Cents	Cost of main- tenance Cents	Available for milk for production Cents	Proportion of ration available for production
10	10	..	..
15	10	5	One-third
20	10	10	One-half
25	10	15	Three-fifths

It will be noted in Table 1 that when the cow is fed only a maintenance ration no feed is available for milk production; when she is fed twice this quantity, half the feed can be used for milk production; when she is fed two and a half times the maintenance, three-fifths of the feed can be so used. One of the most common mistakes in the feeding of dairy cattle on our farms is that the good cows are not fed a sufficient quantity of feed above that required for maintenance. This is especially true of the highly specialized dairy cow; that is, the cow which when fed all she will take makes it all into milk, except what is needed for maintenance. It is, however, unfortunately true that all cows in the dairies of the country are not this kind. Some cows when fresh make all the feed above maintenance into milk for a period of several months before they begin to lay on flesh; others, if fed heavily, begin to gain in weight soon after freshening. From the standpoint of economical milk production one can not generally afford to give a dairy cow more than she will consume without gaining in weight. There are times, however, when it is desirable to make exceptions to this rule; for example, practic-

ally all highly specialized milk producers in the early part of the lactation period lose in weight; that is, they produce milk at the expense of their own body flesh. When such cows approach the end of their milking period they normally regain the flesh they have lost in the early part of this period. The feeder can, therefore, well afford to feed such cows liberally, being assured that the feed will be returned to him in the form of milk when the cows again freshen.

Summer Feeding.

The problems involved in winter and summer feeding are so different as to make a natural division between the two. Summer feeding ordinarily consists in the use of pastures or soiling crops. These may be supplemented when necessary by silage or other roughage or by grain. When dry feeds alone are fed in the summer, the problems are not materially different from winter feeding.

Pasture.

Pasture is the natural feed for dairy cows, and in many respects the best. With abundance of good grasses in fresh, succulent condition, we have one of the rations most conducive to heavy production. Even with the very best of pasture, however, a cow can not be forced to maximum production on it alone. This is owing to the fact that for the greatest production she must be induced to take a large amount of nutrients. The bulky nature of pasture grass places a positive limit upon the capacity of the cow to take feed. In other words, the cow's stomach can not contain grass enough to supply the required nutrients for maximum milk production; therefore, a part of the ration should be of a more concentrated nature. Good pasture contains an abundant supply of succulent, palatable, and nutritious grasses. On such pasture it should be possible for a cow to satisfy her appetite with a few hours' grazing. Pasture of this kind will supply all the food material needed for medium production and a large part of that necessary for large production. For average conditions, with ample pasture of good grasses or legumes in good, succulent condition, good production can be secured. The economy of the use of pasture depends

chiefly upon several factors, such as the price of land, the price of labor, and the lay of the land.

Price of Land.

The price of land has a direct bearing upon the cost of pasture and is an important factor where land values are high. If pasture is to be depended upon entirely for from four to six months in the year, and production is to be kept up to a profitable standard, anywhere from 1 to 4 acres or more must be provided for each cow. This is assuming that in permanent pasture there is a good, clean tuft, with little or no waste places, and that for temporary pasture there is a good stand of grass or legumes throughout. Land which will give these conditions frequently sells at from \$50 to \$300 an acre, and the interest on the investment must necessarily also vary widely, as is shown in Tables 2 and 3.

Table 2—Interest on cost of pasture per cow for the season; interest at 6 per cent on the value of the land, allowing from 1 to 4 acres per cow.

Acres per cow	—Value of land per acre—				
	\$25	\$50	\$100	\$150	\$200
1	\$1.50	\$ 3.00	\$ 6.00	\$ 9.00	\$12.00
1½	2.25	4.50	9.00	13.50	18.00
2	3.00	6.00	12.00	18.00	24.00
2½	3.75	7.50	15.00	22.50	30.00
3	4.50	9.00	18.00	27.00	36.00
3½	5.25	10.50	21.00	31.50	42.00
4	6.00	12.00	24.00	36.00	48.00

Table 3—Cost of pasture per cow per day on basis of Table 2, with a pasture season of 150 days.

Acres per cow	—Value of land per acre—				
	\$25	\$50	\$100	\$150	\$200
	Cents	Cents	Cents	Cents	Cents
1	1	2	4	6	8
1½	1½	3	6	9	12
2	2	4	8	12	16
2½	2½	5	10	15	20
3	3	6	12	18	24
3½	3½	7	14	21	28
4	4	8	16	24	32

It will be seen that the price of land may readily become so high that it would be unprofitable to graze it. In many sections of the country a cow can be fed on dry feed for average production for about 20 cents a day. Therefore, when the daily rental or interest on the value of pasture approaches that sum the farmer should carefully consider other methods of summer feeding.

The cost of caring for permanent pastures must also be taken into consideration. This will consist in the expense of cutting weeds, building and repairing fences, etc.

Price of Labor.

The pasture system of summer feeding reduces to the minimum the amount of labor required to handle a given number of cows, and, therefore, it is especially adapted to conditions where labor is high.

Lay of Land and Roughness of Surface.

In mountainous or hilly sections of the country there is often a part of the farm which, on account of steepness, tendency to wash, or the presence of rock formation near the surface, can not or should not be plowed frequently. On such farms it is often best to plow only the bottoms, keeping the uplands in permanent pastures. The dairyman will find ready application of the pasture system for summer feeding on such farms.

Pasture With Supplements.

Grain.

As has been said, supplementing of pasture with grain is sometimes advisable, even when the pastures are of the best. In many sections, however, pastures are never of the best kind, and in no sections are they always in the best condition. It is evident, therefore, that the commercial dairyman will seldom depend upon pasture alone. Grain should be fed to heavy-producing cows under all pasture conditions.

Prof. C. H. Eckles, of the University of Missouri, suggests

the following-named quantities of grain with abundant pasture for varying production:

Jersey cow producing—

20 pounds of milk daily	3 pounds of grain
25 pounds of milk daily	4 pounds of grain
30 pounds of milk daily	6 pounds of grain
35 pounds of milk daily	8 pounds of grain
40 pounds of milk daily	10 pounds of grain

Holstein-Friesian or Arshyre cow producing

25 pounds of milk daily	3 pounds of grain
30 pounds of milk daily	5 pounds of grain
35 pounds of milk daily	7 pounds of grain
40 pounds of milk daily	9 pounds of grain
50 pounds of milk daily	10 pounds of grain

While this is, of course, an arbitrary rule and variations should be made to suit different conditions and individual cows, it is in accord with good feeding practice and probably is as good a rule of its kind as has been formulated.

For cows of medium production it is usually more economical to feed silage or some green crop rather than grain for supplementing short pasturage. In supplementing pasture with grain it should be remembered that the percentage of protein in the grain ration need not be the same as for winter feeding. Good pasture is an approximately balanced ration. The grain ration to be fed with pasture grass should, therefore, have approximately the same proportion of protein to other nutrients. In the case of extra heavy producers the percentage of protein in the grain mixture should be somewhat greater.

The following-named mixtures are suggested for supplementing pasture without other roughage:

Mixture No. 1—

Ground oats	100 pounds
Wheat bran	100 pounds
Corn meal	50 pounds

Per cent digestible protein, 10.3.

Mixture No. 2—

Wheat bran	100 pounds
Corn meal	100 pounds
Cottonseed meal	25 pounds

Per cent digestible protein, 12.7

Mixture No. 3—

Corn-and-cob meal ..	250 pounds
Cottonseed meal	100 pounds

Per cent digestible protein, 15.5

Mixture No. 4—

Wheat bran	100 pounds
Gluten feed	50 pounds
Corn meal	50 pounds

Per cent digestible protein, 13.6

Soiling Crops.

Pastures, except where irrigation is practiced, are so dependent upon rainfall that there is practically sure to be some period each season when they are short. It is a well-known fact among dairymen that if a cow, for lack of proper feed, falls off in her flow of milk for any period of time it is difficult or impossible to bring her back to a full flow until she again freshens. To carry the cows over this period on grain alone is expensive; consequently, the supplementing of pasture with soiling crops is becoming much more common and is growing in favor. In fact, in many sections it is extremely difficult to keep a herd in maximum production throughout the summer without furnishing some supplemental feed. Unless an abundance of pasture is available, there is practically sure to be a shortage toward the end of the season. Special crops can be grown for these short ages, but they usually involve added expense and inconvenience compared with standard farm crops. Second-growth red clover, oats, peas, or alfalfa are excellent. Corn is available in August and September. These crops are usually a part of the regular cropping system of a well-conducted dairy farm.

The advantages of soiling crops as a supplement to pasture are that large quantities of forage can be grown on a relatively small area, because it is frequently possible to harvest more than one crop in a season on land used for soiling. Another advantage is the palatability and succulence possessed by such crops. With their use pasture need not be cropped so closely and less feed is wasted through tramping by the cattle. By judicious application of the soiling system it is often possible to reduce the acreage of land used for pasture, which in addition to the saving in land required for pasture has the added saving in the cost of fencing. Soiling crops usually are fed in the stable where the manure can be saved for application on cultivated fields.

An objection which can be urged against the use of soiling crops is the greater amount of labor required and the difficulty in using this labor to the best advantage. Another difficulty is to plan a succession of special crops which will at all times during the season supply an abundant supplementary feed. Even with

the best arranged plan, its success depends very largely upon weather conditions.

The Summer Silo.

Silage has found a wide use in this country as a palatable, succulent, and economical roughage for use during the winter. Many of the advantages of its use in winter apply equally well in summer, and there are additional ones that apply alone to the latter season.

The use of a summer silo is particularly applicable on high-priced land. If the land is pastured it will require from 1 to 3 or more acres a season for each cow, while one acre of corn put in the silo will supply succulent roughage for several cows for a like period. It is true that grain will be necessary in addition to silage, but the great problem on high-priced land is to raise a sufficient quantity of roughage.

As has previously been said, soiling crops have been used to a great extent either in place of or in addition to pasture. The greatest disadvantage in their use is that much labor is required. In order to use these crops they must be cut and hauled from day to day. This work is expensive because only small areas are cut at one time, thus making it impracticable to use the harvesting machinery of the farm to advantage and entailing considerable loss of time in harnessing and unhitching the team. Considerable inconvenience also is occasioned by the fact that the field work is pressing at that season of the year and both man and horsepower are badly needed in the fields. Silage, on the other hand, is cut at one operation when the work in the field is not pressing. The crop ordinarily grown for silage is corn, which is a part of the regular farm rotation and consequently fits in well with the regular routine of work.

With a silo for summer feeding, the dairyman always has an abundant supply of feed that is easily handled. By using silage the necessity of cutting and hauling the supplementary roughage during rainy weather is eliminated. Another advantage as compared with the soiling system lies in the fact that with the latter it is often necessary to feed a portion of each

crop after it has matured too much to be palatable, and probably to start on the succeeding one while it is still a little too green. It is difficult to plan exactly so as to prevent these conditions. With silage, however, the crop can be cut at the best stage for feeding and preserved at that point.

One of the most important uses of silage in the summer is as a supplement for short or poor pasture. This condition frequently occurs as a result of long-continued dry weather. Under such circumstances even the most carefully planned soiling system may fail. It is then that the greatest value of the summer silo is realized for with the silo full of well matured silage grown in the previous season, an abundant supply of succulent feed for the cows is available, regardless of weather conditions.

When it is not necessary to use the silo during the summer, it can be sealed up and the silage preserved for winter use. This prevents any waste of feed:

One point, however, must be kept in mind in planning the summer silo. This is the diameter of the silo in relation to the number of cows to be fed and the quantity to be fed to each cow. Silage enough must be fed daily to prevent excessive surface fermentation. As a general rule, a cow under summer conditions will consume about 20 pounds a day. On this basis the diameter of the silo in reference to the number of cows to be fed in summer will be as follows:

20 cows	8 feet in diameter
30 cows	10 feet in diameter
40 cows	12 feet in diameter

Inasmuch as 8 feet is about the minimum diameter of a silo in best practice, it will be seen that the summer silo for supplementing pasture has its best application in herds of 20 cows or more.

Winter Feeding.

The problems involved in winter feeding are usually distinctly different from those of summer feeding. Pasture (or green feed), usually the basis of summer feeding, is not avail-

able. Broadly speaking, there are two factors involved in this problem, first, to satisfy the needs of the cow and, second, to suit the pocketbook. The cow must have an ample supply of feed of a palatable nature, and this feed must be supplied at a price which will permit a profit on the feeding operation.

Viewed from an economic standpoint, there are some fundamental considerations which should first receive attention. In general farm practice it is advisable, so far as is economical, to use the feeds produced on the farm. Often the freight rates and the middleman's charges, if saved, will constitute a good profit for the feeder. This is especially true of roughage. Such feeds are bulky and in most cases must be baled at a considerable cost; the freight rates also are much greater in proportion to the nutrients contained than on the grains.

When land is high in price and the markets for dairy products are good, it is often impracticable to grow all the feeds on the farm. In such cases arrangements first should be made to grow the roughage, on account of the high cost of transporting these feeds. In most cases the prime object of the farm under such conditions will be to supply the greatest possible quantity of roughage.

It is a difficult problem to provide a system of winter feeding of roughage which will make the best use of home-grown roughage and at the same time insure full production. Only a general discussion of the problem can be attempted.

Silage.

In addition to containing the proper nutrients in the right proportion, part of the ration should be of a succulent nature. It is extremely difficult, if not impossible, to keep cows in full production throughout the winter without some succulent feed. There are two chief sources of succulent feed for winter feeding—silage and roots. Of these, silage is in almost universal use by commercial dairymen. While almost any green crop may be used for silage, the heavy yields of corn, as compared with other crops, and its comparative ease of handling, together with its keeping qualities, make it the leading silage crop. Where the

cost of land and the prices of dairy products are high, and the system of farming of necessity is intensive, it is questionable whether the dairyman should consider any other silage crop.

Roots.

The chief function of roots in cattle feeding is to supply a succulent feed. Under general farm conditions the quantity of nutrients grown per acre in root crops is small in comparison to the cost of production. These root crops, however, can be preserved during the winter equally well whether large or small quantities are fed each day, and therefore have special application when only a few cows are to be fed. Of the different root crops, mangel-wurzels furnish the greatest yield per acre. Other kinds of beets and turnips and carrots may be used. Turnips, however, should be fed after milking rather than before, as they cause a bad flavor in the products if fed immediately before milking. Carrots impart a desirable color to the milk.

Dry Roughage.

The best kind of dry roughage to be fed to the dairy cow, in connection with corn silage or roots, are leguminous hays, such as alfalfa, red, crimson, or alsike clover and soy-bean or cowpea hay. While corn silage is an excellent feed, it is not a balanced one, as it does not contain sufficient protein and mineral matter to meet fully the requirements of the cow. The leguminous hays, in addition to being very palatable, have a tendency to correct this deficiency. They are also one of the best and cheapest sources of protein. One or more of these hays can be grown on any farm, and in addition to their value for feeding purposes, they improve the soil in which they are grown. Hay from Canada field peas, sown with oats to prevent the peas from lodging, also makes an excellent roughage.

Corn stover, coarse hay, etc., also find a good market through the dairy cow. This class of roughage is low in protein, however, and when it is used the grain ration must be richer in protein.

No positive rule can be laid down as to the quantity of dry roughage that should be fed, but about 6 to 12 pounds a day for each cow, in addition to silage, will be found to be satisfactory in most cases. When the dry roughage is of poor quality, such as coarse, weedy hay or a poor grade of cornstalks, a large portion can often be given to advantage, allowing the cow to pick out the best and using the rejected part for bedding. With this quantity of dry roughage the cow will take, according to her size, from 25 to 50 pounds of silage. This may be considered as a guide for feeding to apply when the roughage is grown on the farm. When everything has to be purchased, it is often more economical to limit the quantity of roughage fed and increase the grain ration.

Roughage Alone Too Bulky a Ration.

While a cow's stomach is large and her whole digestive system is especially designed to utilize coarse feeds, there is a limit to the bulk that she can take. This limit is below the quantity of roughage that it would require to furnish the nutrients she must have for maximum production; that is, a ration may contain the proper proportions of protein and carbohydrates and still be so bulky that she can not handle it. She therefore should have some grain even though the roughage in itself is a balanced ration.

Importance of a Balanced Ration.

It is probably well at this point to refer briefly to the composition of feedstuffs as it relates to economical feeding of the dairy cow. The cow takes into her digestive system feeds which she utilizes for the production of body tissues, heating the body, performing bodily functions, such as digesting feed, moving from place to place and for milk production. For the purposes of the present discussion, it is sufficient to say that the constituents or compounds and the relative quantities necessary for these operations have been determined; that is, we know that milk contains protein and energy or heat-producing constituents, the protein being represented by the casein and albumin and the

energy and heat-producing constituents by the fat and sugar. In addition to the constituents or compounds necessary for the production of milk, she also must have the constituents necessary for performing the other functions mentioned. These, for convenience, have been classified into proteins, carbohydrates, and fats. Fats perform much the same functions as carbohydrates and are worth for production practically two and one-fourth times as much per pound as carbohydrates, and in the balancing of a ration are usually classed with them. This brings us to a definition of a "balanced ration," which is a ration containing these various nutrients in the proportion the cow needs them.

The economical importance of a balanced ration is evident. The cow can use only certain elements or compounds in certain proportions; consequently, if the ration supplies an excessive amount of any one, the excess is liable to be wasted. Not only is this true, but as the cow has to assimilate it even though she can not use it, her capacity for production is reduced.

Cost.

In making a ration, cost is one of the important factors. The best practice is to compound a grain mixture so that it will balance with the home-grown roughage. With this in mind, the separate grains should be selected to supply the necessary nutrients at the lowest possible cost. For this, not only the price per hundred pounds but also the relative cost of each constituent, especially protein, must be considered. For example, to determine the cost of a pound of digestible protein in a given feed divide the price of 100 pounds by the per cent of digestible protein in the feed. If this calculation is made for several feeds, the relative cost of protein in each will be apparent. Then the feeds that furnish protein at the least cost can be selected. The same can be done to determine the cost of the carbohydrates and fat, which are the heat-making or energy-producing part of the feed.

Bulk.

A certain bulk is necessary in the grain mixture to obtain the best results. When heavy feeds are used, some bulky ones should be included to lighten the mixture, since it is probable that a certain degree of bulkiness aids digestion. Some of the common feeds are classified as to bulk in Table 4:

Table 4—Classification of common feeds as to bulkiness.

Bulky	Medium	Heavy or compact
Alfalfa meal	Corn meal or feed	Cottonseed meal
Corn-and-cob meal	Hominy	Linseed meal
Bran (wheat)	Gluten feed	Coconut meal
Dried Brewers' grains	Rye	Peanut meal
Dried distillers' grains	Barley	Gluten meal
Oats, ground	Buckwheat middlings	Wheat middlings
Malt sprouts		
Dried beet pulp		

Palatability.

Palatability is of great importance in successful feeding. The best results can not be obtained with any feed which is not well relished by the cow; consequently any unpalatable feed to be used should be mixed with those that are appetizing.

Physiological Effect.

In making the grain mixture care should be exercised that too large a quantity of either constipating or laxative feed is not included. Cottonseed meal, for example is decidedly constipating and should be fed with laxative grains or succulence, such as silage or roots. For ordinary feeding in most parts of the United States not more than one-third of the grain should be cottonseed meal. In some sections larger quantities have been fed, but this practice is not to be recommended. On the other hand, linseed-oil meal, because of its distinctly laxative action, should not be fed ordinarily in greater quantities than $1\frac{1}{2}$ pounds a day.

Nutritive Value of the Grains and Concentrates.

As a general rule, the energy or heat-producing material is found chiefly in the stem and leaves of the plant and the protein is largely in the seeds. The great exception is in the case of legumes, which have larger percentages of protein throughout the plant and particularly in the leaves. It should be noted, therefore, that in supplying grain we are chiefly concerned with the protein it contains.

Two classes of feeds are used for making up the grain ration, namely, grains and by-products of the manufacturing industries. The grains produced on the farm and commonly used for cattle feeding are corn, oats, barley and rye. In many cases the demand for these grains for other purposes has become so great that the dairyman can not afford to use them; consequently, it has usually been found more economical to use the by-products of the manufacturing industries. The following are among the most common of these feeds: Wheat bran, wheat middlings, linseed meal, cottonseed meal, gluten meal, gluten feed, hominy feed, brewers' grains, malt sprouts, distillers' grains, beet pulp, molasses, buckwheat middlings, coconut meal, peanut meal.

The following analysis represent digestible nutrients in 100 pounds. The fat is multiplied by 2.25 and added to the carbohydrates. This represents the energy or heat-making part of the feed.

Wheat Bran.

Digestible Nutrients—Protein, 12.5 per cent; carbohydrates and fat, 48.4 per cent.

Bran is the outside coating of grains, and is the residue or by-product from the manufacture of flour. Wheat bran may be derived from winter or spring wheat, and there is little difference in its composition from either source.

From a physiological standpoint wheat bran is one of the very best feeds for cows. It is slightly laxative in nature, and generally tends to keep the cow's digestive system in good condition. The price based upon its protein content is usually so

high that most commercial dairymen combine it with other feeds in which protein costs less per pound. Aside from the value of the nutrients which it contains, it has a special value in a feeding mixture, as it gives bulk and adds to the palatability. Wheat bran may be used when the rest of the grain ration is lacking in palatability or is of a constipating nature. It is especially good when the roughage is all dry. The best grades of wheat bran are of light weight, with large flakes. Some of the large mills put the sweepings of the mill into the bran; therefore, it is usually best to buy the highest grade of bran, provided the mills grading it are reliable. The output of small country mills is usually of excellent quality. Bran contains a high proportion of phosphorus and potash in its ash content.

Wheat Middlings.

Digestible nutrients—Protein, 13.4 per cent; carbohydrates and fat, 55.9 per cent.

Standard wheat middlings or shorts are composed of the finer portions of the bran together with the coarser portion of the flour. They are not quite so flaky as bran, are a little less laxative, and contain a somewhat smaller quantity of ash. In other respects they may be said to resemble bran closely. This feed is somewhat pasty when moist, and consequently lacks bulk.

Linseed Meal.

Digestible nutrients—Old process: Protein, 30.2 per cent; carbohydrates and fat, 47.7 per cent. New process: Protein, 31.7 per cent; carbohydrates and fat, 44.2 per cent.

Linseed meal is a by-product of the manufacture of linseed oil from flaxseed, and is produced under two processes, known as the old and the new. Linseed meal or oil meal from a physiological standpoint is one of the very best feeds. It is laxative, palatable, and a very good "conditioner," but, like wheat bran, its price is usually excessive for its nutritive value. It has, however, a distinct place in a mixture in supplying pro-

tein to increase the palatability and improve the physiological effect. It is very heavy, so that it is well to feed it in connection with a bulky feed. It is especially applicable in a mixture to be fed with dry roughage.

Cottonseed Meal (Choice).

Digestible nutrients—Protein, 37 per cent; carbohydrates and fat, 41.2 per cent.

Cottonseed meal is the richest in protein of all the common cow feeds on the market. It is usually the cheapest source of protein available, but it does not have the best physiological effect upon the cow, often causing digestive troubles if fed in large quantities for long periods. At first it is advisable to start with 1 to 2 pounds a day, gradually increasing the quantity if no bad results are observed. In some herds in the North as high as 5 to 6 pounds a day are fed without bad results. In the South there seems to be no limit in this direction.

Cottonseed meal is a highly concentrated feed and should, if possible, be fed in a mixture with some bulky feed like bran. It can be fed to better advantage when the roughage contains an ample quantity of succulent feed. While its physiological effect in the North at least is not good as compared with most other cow feeds, its cheapness and the fact that in time the cows seem to overcome this tendency to digestive trouble from it are rapidly giving it great prominence as a cheap source of protein for dairy cows.

Gluten Meal and Gluten Feed.

Digestible nutrients—Gluten meal: Protein, 30.2 per cent; carbohydrates and fat, 53.8 per cent. Gluten feed: Protein, 21.6 per cent; carbohydrates and fat, 59.1 per cent.

Gluten meal is a by-product of the manufacture of starch from corn. The basis of the meal is the germ part of the corn kernel. Gluten feed is composed of the gluten meal plus a certain quantity of corn bran, which makes it lighter than the meal. Both feeds are fairly palatable and are usually among the cheapest source of protein.

Dried Brewers' Grains.

Digestible nutrients—Protein, 21.5 per cent; carbohydrates and fat, 44.2 per cent.

Dried brewers' grains rank with wheat bran as a flaky bulky feed. The physiological effect is nearly if not quite as good as bran. They differ in that they carry a somewhat larger percentage of protein than bran. Cows sometimes do not eat these grains readily at first, but soon overcome this aversion.

Malt Sprouts.

Digestible nutrients—Protein, 20.3 per cent; carbohydrates and fat, 50.3 per cent.

Malt sprouts are loose and bulky and cows usually do not take them readily at first. The chief place of this feed is with other feeds in a mixture. Both brewers' grains and malt sprouts come from barley and are by-products from the manufacture of beer.

The proprietary feed companies control at the present time a large percentage of the output of dried grains and malt sprouts from the larger breweries and these excellent feeds do not now appear unmixed on the market to so great an extent as they did a few years ago.

Hominy Meal, Feed, or Chop.

Digestible nutrients—Protein, 7 per cent; carbohydrates and fat, 77.6 per cent.

This by-product of the manufacture of hominy consists of part of the starchy portion of the corn and part of the germ. It is variously known as the heading suggests, as hominy meal, feed, or chop. In many respects it resembles corn and is a good substitute for it. This feed is used chiefly to furnish the energy or heat-making part of the ration, but because of its low percentage of protein it is not an economical source of the latter.

Dried Distillers' Grain.

Digestible nutrients—Corn grains: Protein, 22.4 per cent; carbohydrates and fat, 66.5 per cent. Rye grains: Protein, 13.6 per cent; carbohydrates and fat, 52.8 per cent.

These grains are the by-product of the manufacture of alcohol and distilled liquors from corn and rye. Both kinds are

rather bulky and usually the corn grains are among the cheapest sources of protein. These grains are not particularly palatable, consequently they should be used with other feeds in the grain ration.

Dried Beet Pulp.

Digestible nutrients—Protein, 4.6 per cent; carbohydrates and fat, 67 per cent.

Dried beet pulp is a by-product from the manufacture of sugar from the beet. As a source of protein it is not of high value, and the farmer should recognize this fact when he buys it. It is bulky, however, and has an excellent physiological effect upon the cow as it aids in keeping her digestive organs in good condition. When for any reason neither silage nor roots are available the pulp can be soaked for about 12 hours in about four times its weight of water; it then constitutes a good substitute for a succulent roughage. Beet pulp should be classed as a carbohydrate rather than as a protein feed.

Molasses.

Digestible nutrients—Protein, 1 per cent; carbohydrates and fat, 58.2 per cent.

Molasses, from both the beet and cane sugar factories, is valuable as a source of energy or heat-making material, the main difference between the two kinds being that the former is more laxative when fed in large quantities. When fed in small quantities, molasses adds materially to the palatability of the ration, but unless it is very low in price it is not usually an economical feed for dairy cows.

Buckwheat Middlings.

Digestible nutrients.—Protein, 24.6 per cent; carbohydrates and fat, 52 per cent.

This floury feed is composed largely of that part of the buckwheat kernel under the hull together with some of the coarsest of the flour. It is rather heavy and tends to produce a tallowy butter if fed in large quantities. In certain sections it is one of the cheap sources of protein. Frequently bran and

chaff are added to the middlings, thus greatly reducing their feeding value.

Coconut Meal.

Digestible nutrients—Protein, 18.8 per cent; carbohydrates and fat, 60.2 per cent.

This meal is the ground cake resulting from the manufacture of coconut oil. It is a rather heavy feed, which on account of its high oil content, tends to become rancid if kept for long periods in the summer. If it is possible to obtain coconut meal at a reasonable price it will be found to be a valuable addition to the ration.

Peanut Meal.

Digestible nutrients—Hulled nuts: Protein, 42.8 per cent; carbohydrates and fat, 36.6 per cent. With hulls, Protein, 20.2 per cent; carbohydrates and fat, 38.5 per cent.

This meal is the by-product of the manufacture of peanut oil and varies greatly in composition, depending upon the percentage of hulls it contains. It is an excellent dairy feed and in some sections is a cheap source of protein.

Farm Grains.

Some of the more common grains that are grown upon the farm will be described briefly below.

Corn.

Digestible nutrients—Corn meal: Protein, 6.9 per cent; carbohydrates and fat, 76.9 per cent. Corn-and-cob meal: Protein 6.1 per cent; carbohydrates and fat 72 per cent.

Corn is probably the most common grain grown upon the farm and is well adapted to be part of the ration of a dairy cow. Corn is palatable, heavy, and one of the best and cheapest sources of the energy or heat-making part of the ration, but, on account of its low protein content, it should not form the entire

grain ration. In order to lighten up this grain, the cob is often ground with the kernel, the resulting meal being called corn-and-cob meal. This feed is more bulky and better adapted for mixing with heavy grains.

Oats (Ground).

Digestible nutrients—Protein, 9.4 per cent; carbohydrates and fat, 60.6 per cent.

This very palatable cereal is slightly laxative and very well adapted for feeding dairy cattle. Owing to the high market price of oats, it is usually more economical to sell them and purchase other feeds which furnish nutrients at a cheaper price.

Barley (Ground).

Digestible nutrients—Protein, 9 per cent; carbohydrates and fat, 70.4 per cent.

This is a palatable feed and one that can be used to good advantage as a source of carbohydrates or energy material for dairy cows where its price is moderate. Like corn, it should not be the only grain in the ration.

Rye (Ground).

Digestible nutrients—Protein, 9.2 per cent; carbohydrates and fat, 70.5 per cent.

This grain is not especially palatable and should not be used in large quantities, as it tends to produce a hard, tallowy butter. Mixed with other feeds, it is often a valuable addition to the ration.

Roughage.

All roughage may be divided for convenience into two general classes with reference to its content of protein. In the first or low protein class are placed corn silage, corn stover, timothy hay, millet hay, prairie hay, hays from the common grasses, straws of the various cereals, and cottonseed hulls. The second

or high-protein, class includes the various legume hays such as alfalfa, the clovers, cowpea, soy bean, and oat and pea. Economy in feeding demands that grain should supplement the roughage, consequently the grain mixtures will be compounded to fit the class to which the roughage belongs.

Compounding a Grain Mixture.

A few simple rules for making up a grain mixture are given briefly below:

1—Make up the mixture to fit the roughage available. With roughage entirely of low-protein class the grain should contain approximately from 18 to 22 per cent of protein, while with exclusively high-protein roughage the grain ration need contain only about 13 to 16 per cent.

2—Select grains that will furnish the various constituents, especially protein, at the least cost, using home-grown grains if possible.

3—Be sure that the mixture is light and bulky.

4—The mixture should be palatable.

5—See that the grain has the proper physiological effect upon the cow.

All these suggestions should be kept in mind in order to obtain the best possible combination of grains. For the convenience of the feeder Table 5, showing the digestible protein content of the more common grains and by-products feeds, is given. The per cent columns are arranged in 5 per cent divisions.

Table 5—Approximate digestible protein content of various grains and by-products.

Average 5 per cent (2.5 to 7.4 per cent).	Average 10 per cent (7.5 to 12.4 per cent).	Average 15 per cent (12.5 to 17.4 per cent).	Average 20 per cent (17.5 to 22.4 per cent).
Corn meal Corn-and-cob meal Hominy feed Dried beet pulp	Wheat, ground Oats, ground Barley, ground Rye, ground Buckwheat, ground Sorghum grains, ground	Wheat bran Wheat middlings Dried distillers' grains (rye)	Gluten feed Malt sprouts Dried brewers' grains Dried distillers' grains (corn) Coconut meal. Peanut meal with hulls Cowpeas
Average 25 per cent (22.5 to 27.4 per cent).	Average 30 per cent (27.5 to 32.4 per cent).	Average 35 per cent (32.5 to 37.4 per cent).	Average 40 per cent (37.5 to 42.4 per cent).
Buckwheat middlings	Gluten meal. Linseed meal (both processes Soy beans.	Cottonseed meal.	Peanut meal (hulled nuts)

The per cent of protein in a grain mixture may be found as follows: Take any number of parts of any number of feeds in the table and for each part put down the per cent of the column in which it is found. Add these numbers and divide the sum by the number of parts. Examples:

1 part wheat bran 15
 1 part cottonseed meal 35
 1 part gluten feed 20

—
 3

—
 3) 70
 —

23.3 per cent protein

3 parts wheat bran (3×15)	45
2 parts cottonseed meal (2×35)	70
1 part gluten feed (1×20)	20

6	6) 135
---	--------

22.5 per cent protein

The approximate price of a ration per pound of protein may be ascertained as follows: Divide the total price of the mixture by the average protein content as derived above. The mixture costing the smallest price per pound of protein, other things being equal, is the most economical. Unfortunately, other things are never exactly equal, for the physiological effect of the grain, bulk, and palatability must also be taken into consideration. Practically all the grain feeds low in protein are rich in carbohydrates, but, as already stated, grains are purchased primarily for their protein content, as almost invariably the carbohydrates can be produced more cheaply in the form of corn silage, cornstalks, etc. While the above-mentioned method of testing the economy of a grain ration is not entirely accurate, it is usually a safe method to follow.

**Samples of Grain Mixtures To Be Fed With Various Roughages.
With Low-Protein Roughages.**

The following grain mixtures are adapted to be fed with roughage of the low-protein class, such as corn silage, corn stover, timothy, prairie, rowen, or millet hays, cottonseed hulls, etc.

Mixture 1.—Per cent of digestible protein, 18.4.

500 pounds corn meal.

400 pounds dried distillers' grains (corn).

200 pounds gluten feed.

300 pounds linseed meal (old process).

Mixture 2.—Per cent of digestible protein, 19.8.

100 pounds corn meal.

- 100 pounds cottonseed meal.
- 100 pounds linseed meal (old process).
- 200 pounds wheat bran.

Mixture 3.—Per cent digestible protein, 19.8.

- 300 pounds corn meal.
- 200 pounds cottonseed meal.
- 100 pounds dried distillers' grains (corn).
- 100 pounds gluten feed.

Mixture 4.—Per cent of digestible protein, 19.8.

- 200 pounds corn-and-cob meal.
- 100 pounds cottonseed meal.
- 100 pounds linseed meal (old process).

Mixture 5.—Per cent of digestible protein, 18.8.

- 200 pounds corn meal.
- 150 pounds cottonseed meal.
- 100 pounds gluten feed.
- 100 pounds wheat bran.

Mixture 6.—Per cent of digestible protein, 18.1.

- 200 pounds corn meal.
- 100 pounds cottonseed meal.
- 100 pounds oats, ground.
- 100 pounds linseed meal (old process).

Mixture 7.—Per cent of digestible protein, 19.4:

- 400 pounds corn meal.
- 200 pounds cottonseed meal.
- 300 pounds gluten feed.
- 400 pounds dried brewers' grains.

Mixture 8.—Per cent of digestible protein, 18.3:

- 200 pounds corn meal.
- 100 pounds linseed meal (old process).
- 150 pounds gluten feed.
- 200 pounds dried brewers' grains.

Mixture 9.—Per cent of digestible protein, 18.4:

- 300 pounds corn-and-cob meal.
- 200 pounds cottonseed meal.

Mixture 10.—Per cent of digestible protein, 19.1:

- 200 pounds corn-and-cob meal.

100 pounds cottonseed meal.
100 pounds gluten feed.
100 pounds buckwheat middlings.

Mixture 11.—Per cent of digestible protein, 19.1:

200 pounds barley .
200 pounds cottonseed meal.
100 pounds alfalfa meal.
100 pounds wheat bran.

With High-Protein Roughages.

With roughage of the high-protein class, such as clover, alfalfa, soy beans, cowpeas, and vetch or other legume hay, the following grain mixtures may be used:

Mixture 12.—Per cent of digestible protein, 14.1:

400 pounds corn meal.
100 pounds cottonseed meal.
100 pounds gluten feed.
100 pounds wheat bran.

Mixture 13.—Per cent of digestible protein, 15.6:

400 pounds corn meal.
200 pounds gluten feed.
200 pounds linseed meal (old process).
100 pounds oats, ground.

Mixture 14.—Per cent of digestible protein, 14.9:

200 pounds corn meal.
200 pounds gluten feed.
100 pounds malt sprouts.
100 pounds wheat bran.

Mixture 15.—Per cent of digestible protein, 16.7:

300 pounds barley.
100 pounds cottonseed meal.
100 pounds alfalfa meal.
100 pounds wheat bran.

Mixture 16.—Per cent of digestibility protein, 13.7:

100 pounds barley.
200 pounds coconut meal.
100 pounds oats, ground.

- 100 pounds wheat bran.
Mixture 17.—Per cent of digestible protein, 15.8:
300 pounds corn-and-cob meal.
200 pounds gluten feed.
100 pounds cottonseed meal.
100 pounds wheat bran.
Mixture 18.—Per cent of digestible protein, 15.5:
100 pounds corn meal.
100 pounds linseed meal (old process).
100 pounds oats, ground.

With Combination of Low and High Protein Roughages.

The following grain mixtures are adapted for feeding with a combination of the low and high protein classes of roughage, such as silage and clover, or other legume hay; corn stover and clover, or other legume hay; mixed hay, or oat-and-pea hay, etc.:

- Mixture 19.—Per cent of digestible protein, 16.3:
400 pounds corn meal.
300 pounds dried distillers' grains (corn).
100 pounds gluten feed.
100 pounds linseed meal (old process).
Mixture 20.—Per cent of digestible protein, 16.1:
300 pounds corn meal.
100 pounds cottonseed meal.
100 pounds linseed meal (old process).
200 pounds wheat bran.
Mixture 21.—Per cent of digestible protein 16.4:
400 pounds corn meal.
100 pounds cottonseed meal.
200 pounds dried distillers' grains (corn).
100 pounds gluten feed.
Mixture 22.—Per cent of digestible protein, 16.7:
400 pounds corn meal.
100 pounds cottonseed meal.
200 pounds gluten feed.
200 pounds dried brewers' grains.
Mixture 23.—Per cent of digestible protein, 16.4:

200 pounds corn-and-cob meal.

100 pounds cottonseed meal.

Mixture 24.—Per cent of digestible protein, 16.7:

200 pounds corn meal.

100 pounds peanut meal (with hulls).

100 pounds cottonseed meal.

100 pounds wheat bran.

Mixture 25.—Per cent of digestible protein, 16.4:

100 pounds corn meal.

100 pounds oats, ground.

100 pounds cottonseed meal.

100 pounds wheat bran.

The above-named mixtures which contain linseed meal are particularly adapted for use when no succulence is in the ration.

Quantities of Roughage and Grain To Feed.

In this connection the general principles brought out earlier in the discussion should always be kept in mind, namely, that economical feeding demands that the cows be fed to full capacity. To do this and to have the best effect on the individual cow requires a thorough knowledge of feeds and of cows. To give a few practical rules to guide the beginner in obtaining this knowledge is all that has been attempted in this publication. Rules of this nature in reference to the quantities to feed will not be out of place.

1.—*Under most circumstances the cow should be fed all the roughage that she will eat up clean, adjusting the grain ration to the milk production. Only when the cow tends to become over-fat should the quantity of roughing be restricted.*

2.—*A grain mixture should be fed in the proportion of 1 pound to each 3 pints or pounds of milk produced daily by the cow, except in the case of a cow producing a flow of 40 pounds or more, when the ration can be 1 pound to each 3½ or 4 pounds of milk. An even better rule is 1 pound of grain each day for every pound of butter fat produced during the week by the cow.*

3.—*Feed all the cow will respond to in milk production. When she begins to put on flesh, cut down the grain.*

Individual Feeding.

Different cows have different capacities for converting feed into milk. For this reason the above-mentioned rules can serve only as indicators for the inexperienced feeder. No man who has not a full appreciation of the wide variation in individual cows will be fully successful as a feeder. Some cows may have natural capacity for producing large quantities of milk, and may not receive feed enough for maximum production. By increasing the feed of the highest-producing cows and carefully consulting the milk sheets on which each cow's daily production is recorded, the skillful feeder will soon find that some cows in the herd will respond to the increased allowance and return a good profit on the additional feed given. On the other hand, there are cows that have a limited capacity for milk production and are very liable to be overfed. By carefully studying each individual cow the feeder will soon ascertain the point beyond which any addition to the grain ration becomes unprofitable.

Water For Cows.

All animals require plenty of good, pure water. This is especially true of the milking cow, as water constitutes more than three-fourths of the total volume of milk. The water supply, therefore, demands the dairyman's most careful attention. Stale or impure water is distasteful to the cow and she will not drink enough for maximum milk production. Such water may also carry disease germs which might make the milk unsafe for human consumption or be dangerous to the cow herself. During the winter, when cows are stabled the greater part of the time, they should be watered two or three times a day unless arrangements have been made to keep water before them at all times. The water should, if possible, be 15° or 20° above the freezing point, and should be supplied at practically the same temperature every day. When water well above freezing temperature is stored in tanks and piped directly to the cow, there is probably little occasion for facilities to warm it. When it stands in a tank on which ice often forms, it usually pays well to warm it

slightly. This can be done by a tank heater, by live steam, or by hot water from a boiler. If a boiler is used for running a separator or for heating water to wash and sterilize utensils, steam from it can readily and cheaply be used to warm the water.

Salt.

Salt is required by all animals. The dairy cow requires an ounce or more a day, and while she should be given all she needs she should not be forced to take more than she wants. It is best, therefore, to give only a small quantity on the feed, and to place rock salt in boxes in the yard where she can lick it at will.



DIRECTOR'S ANNUAL MEETING.

Directors of Illinois State Dairymen's Association met for their annual meeting in Springfield, Sept. 14, 1916. President J. P. Mason presided.

The annual reports of the Secretary and Treasurer were presented and as they had already been audited by Director J. B. Newman, they were approved.

Geo. Caven, Wilmette, Ill., and Chas. Foss, Cedarville, Ill., were re-elected without opposition.

Jacksonville and Danville appeared as leading candidates for the next Annual Convention, to be held in January, 1917. The directors, after hearing the arguments for each place, decided in favor of Danville because of the fact that a meeting had never been held in the extreme eastern part of the State, while several meetings have been held in recent years in the vicinity of Jacksonville.

It was voted also to hold a week of one-day meetings about Jacksonville, ending with a one or two days' meeting in that City, the time for holding the meetings to be determined by the Secretary after consultation with the Jacksonville representatives.

It was voted also to delegate the President, Mr. J. P. Mason, to attend the National Dairy Show, or, in case he was unable to attend, to appoint a delegate.

All of the directors were present at the meeting except Mr. J. B. Newman, who was in the East at that time.

GEO. CAVEN,
Secretary.

THE STATE EGG LAW. EGG BREAKING ESTABLISHMENTS. "BREAKING STOCK."

**Illinois State Food Department, W. Scott Matthews,
Commissioner.**

The Law.

Section 39B: It shall be unlawful to ship, or otherwise dispose of in any kind of a container, or in any other manner, any collection of eggs, or any eggs known as "yolks stuck to the shell," "heavy blood rings," "partially hatched," "moldy eggs," "black spots," "black rots," or any other eggs of an unwholesome nature unless the same are broken in the shell and then denatured, so as to render the same unfit for human food.

Eggs exclusive of the above named varieties which are not intended for sale to the trade in shell form, are hereby declared "Breaking Stock."

"Breaking Stock" when packed in cases sealed with proper identifying strips, that have been approved by the State Food Commissioner, may be shipped from within or without the State of Illinois, either directly or otherwise, to licensed egg breaking establishments in Illinois.

All persons, firms or corporations that engage in the State of Illinois in the business of removing eggs from their shells in the manufacture of frozen, liquid, dessicated, or any other form of whole egg, yolks, whites or any mixture of yolks and whites, with or without the addition of any other ingredients, shall before engaging in such business apply to the State Food Commissioner for a license. Thereupon the State Food Commissioner or his agents shall inspect the establishment and equipment of said egg breaking establishment, and he shall also ascertain if the said establishment complies in method and equipment with the Sanitary Law and the rules and regulations that shall from time to time be established by the State Food Commissioner for the governing of these establishments. If after such inspection

it shall appear that the said establishment complies with the provisions of the Sanitary Law and the rules and regulations governing egg breaking establishments, then the said Food Commissioner shall certify to the State Treasurer that the said establishment is entitled to a license.

Every person, firm or corporation engaged in the breaking of eggs, and whose establishment has been inspected and approved, as above described, shall pay annually during the month of December of each year a license fee of Three Hundred Dollars (\$300) for each establishment to the Treasurer of the State of Illinois. Said Treasurer shall in each case at once certify to the State Food Commissioner the payment of such fee, and thereupon the State Food Commissioner shall issue a license to such establishment.

It shall be unlawful for any one to have in his possession eggs known as "yolks stuck to the shell," "heavy blood rings," "partially hatched," "moldy eggs," "black spots," "black rots," or any other unwholesome eggs, unless the same are broken in shell and then denatured, so as to render the same unfit for human food.

Every egg breaking establishment, when it has received its license, shall be furnished with an identifying establishment number. Said number shall be included as part of the proper labeling of all cans or other receptacles in which frozen or desiccated egg products are offered for sale. The form and manner of placing said number on containers shall be under rules and regulations promulgated by the State Food Commissioner.

Brokers, commission men, or ordinary receivers of eggs who have eggs shipped to them in these "breaking stock" identified cases, may break the seal and examine the stock, but they must reseat the identified strip where it is cut, with another identifying strip which carries their name and address and the date of which they inspected the eggs. They will be held responsible for any tampering of the contents of the identified case.

Whoever shall violate any of the provisions of this section, shall be guilty of a misdemeanor and shall be punished as pre-

vided in this Act, and in addition thereto the State Food Commissioner shall at once revoke such offender's license.

**Rules and Regulations for the Guidance of all Those Interested in the
Above Law.**

The following rules and regulations are being issued for the enforcement thereof. The Department's interpretation of the law is reflected in these rules and regulations.

It shall be unlawful to ship or otherwise dispose of in any kind of a container or in any other manner, any collection of eggs or any eggs known as "yolks stuck to the shell," "heavy blood rings," "partially hatched," "moldy eggs," "black spots," "black rots," or any other eggs of an unwholesome nature, unless the same are broken in the shell and then denatured so as to render the same unfit for human food.

1. We are desirous of securing for this State, shipments of eggs containing the smallest number of unwholesome ones within the bounds of good commercial practice. We are strongly urging the country merchant and collector to buy eggs on a "loss off" basis from the farmer, candling them in his presence, or at least before paying for them. When the farmer is paid for the good eggs only, and has the bad eggs returned to him, he becomes aware of the results of his carelessness and he will take better care of eggs.

2. Our aim is to reach the man who is originally responsible for the bad eggs. Such persons if they reside within the State of Illinois will be subject to the penalties of the Food Law. On the other hand, it is not the intention of the Illinois Food Department to prosecute an Illinois receiver of eggs shipped from another State, when the eggs are in violation of the law through the carelessness, inexperience or wilfulness of a shipper outside of Illinois. Such cases will be brought to the attention of the Federal authorities, central division, and to the proper officials of the State from which the eggs were shipped. Illinois receivers and brokers who are in the habit of receiving eggs and forwarding the same to other receivers or brokers,

without rehandling, will not be held responsible for the condition of the eggs.

3. It is conceded that in all cases of eggs of whatever grade as received in the larger egg centers there is likelihood of the presence of a certain number of eggs unfit for food. In enforcing the food law as applied to eggs, the State Food Department will take cognizance of this fact, as also of weather and of transportation conditions. However, the State Food Department does not approve of the present practice of dealing in "current receipts," by which term is understood a miscellaneous collection of eggs, good and bad, as received from the farmer and forwarded without previous inspection. At certain times of the year current receipts may contain but few bad eggs, while at other seasons the proportion of inedible eggs will be excessive. We therefore ask your co-operation, in informing the country merchants and egg dealers of their responsibility under the law, and that they candle all eggs at such seasons of the year when weather and other conditions make it likely that the eggs received from the farmers will consist in whole or in part of eggs of the prohibited classes. We also urge upon egg associations or butter and egg boards that they discourage the quotation for "current receipts," since it is the experience of the State Food Department that its work in raising the quality of eggs is hampered when a market is offered for uninspected eggs. It is not expected that the country merchant can grade eggs for the various egg centers, but it is possible for him to remove eggs of the prohibited classes.

4. Whenever a lot of eggs in Illinois is placed under seizure by the State Food Department there will be no intention of holding up the good eggs in the shipment. It will be the aim to have these eggs candled as soon as possible by some recognized expert, the good eggs resulting therefrom being released to the owner. A record will be made of the proportion of bad eggs, for evidence of violation of the law. Receivers need have no concern that consignments will be seized as long as the "dead loss" is within the limits now recognized by the National Poultry, Butter and Egg Association for the indicated candled grade;

and in no case is the "dead loss" for uncandled eggs to exceed the limit specified for the lowest grade of candled eggs.

5. It will be noted that it is the intention of the State Food Department to take action only against the person responsible for the bad eggs. There is therefore an obligation on the part of the egg receivers to exercise due care that spoilage of the eggs has not resulted from any neglect on their part.

It shall be unlawful for any one to have in his possession eggs known as "yolks stuck to the shell," "heavy blood rings," "partially hatched," "moldy eggs," black spots," "black rots," or other unwholesome eggs, unless the same are broken in the shell and then denatured, so as to render the same unfit for human food. This paragraph will be construed as follows:

6. Where eggs of this character are handled, they shall be broken into a tight container and denatured, unless they are disposed of to some concern who uses them for other than food purposes, and where the denaturant interferes with their use. In such cases, upon satisfactory evidence to the Department, that the eggs will not get into food channels, directly or indirectly, they may be placed in approved containers without denaturant, and the "black rots" need not be broken in the shell. *The usual egg case will not be acceptable as a "tight container" for eggs, separated out as unfit for food, during the candling process.*

7. For eggs intended for breaking establishments, no other term than "Breaking Stock" will be sanctioned. Such terms as "For manufacturing purposes," "For commercial purposes," "Unfit for human food," "Rots and spots," "No. 3 Eggs," or any other name of like nature will not be recognized by the Food Commissioner.

"Breaking Stock" when packed in cases sealed with proper identifying strips, that have been approved by the State Food Commissioner may be shipped from within or without the State of Illinois either directly or otherwise, to licensed egg breaking establishments in Illinois.

8. "Proper identifying strips" will be approved if made of linen or other not easily torn material, two inches wide. The strip shall be applied to the case by fastening one end to the bot-

tom, extending the strip over both sides and top of the case and ending on the bottom. The location of the strip on the case shall be that of the middle vertical partition. One side of the strip shall be coated with an adhesive material which will hold the strip securely to the case. The other side of the strip shall bear the words "Breaking Stock" on two portions of it, so spaced that when the seal is properly attached the words "Breaking Stock" will appear on both sides of the case.

Brokers, commission men, or ordinary receivers of eggs who have eggs shipped to them in these "Breaking Stock" identified cases, may break the seal and examine the stock, but they must reseal the identified strip where it is cut, with another identifying strip which carries their name and address and the date on which they inspected the eggs. They will be held responsible for any tampering with the contents of the identified cases.

9. It is a violation of the law for any one, except a shipper, recognized broker, commission merchant, receiver of eggs or licensed egg breaking establishment to have in his possession any cases of eggs marked "Breaking Stock." Egg breaking establishments shall keep a record of all purchases of "breaking stock," which record shall be open to the Food Commissioner or his agents at all times.

10. ALL CASES OF EGGS, OF WHATEVER GRADE MUST HAVE THE NAME AND ADDRESS OF THE SHIPPER EITHER BY MEANS OF A SHIPPING TAG OR BY STENCIL.

For Egg Breaking Establishments.

FOREWORD: Pursuant to Section 39b of the Food and Dairy Law, in force July 1st, 1915, the regulations contained herein are issued for the information and guidance of those engaged in the egg breaking industry. Consideration has been given both towards securing for the consumer a wholesome and nutritious product, and towards conserving eggs of food value which would otherwise be destroyed. The main points in the successful production of a wholesome frozen egg are:

1. The egg in the shell must be of good quality.
2. The eggs must be frozen as soon as possible after removal from the shell.
3. The egg breaking establishment must be conducted with strict regard to sanitation and cleanliness.

The rules and regulations contained herein supplement the provisions of the Sanitary Law.

While ample lee-way is allowed each establishment in the exercise of individuality, it is felt that certain features of construction and operation are fundamental and should be standardized. It should be understood that the requirements are the minima. The Food Department offers its aid and co-operation to any one desiring detailed information on construction and operation tending towards the highest efficiency, but which it is felt could not well be demanded of all egg breaking establishments.

Regulation 1...Classes of eggs prohibited: All eggs before entering the breaking room are to be carefully candled. Any and all eggs commonly known as "black rots," "black spots," "stuck," "mixed" (addled) "blood rings" or any other egg which from its appearance before the candle is certain to possess an odor or visible deterioration when broken out of the shell, are to be rigidly excluded from the breaking room. The eggs listed above are to be denatured as soon as candled out, by breaking the shell of the same and treating the mass with a denaturant. Said denaturant may be carbolic acid, creosote, birch oil or some other approved material. Or such eggs may be disposed of as indicated in paragraph 6, previously given.

In the breaking room, besides the special classes listed above, there shall be excluded from the product intended for human food: All eggs with a "green" or "cloudy, watery" white, or with any other abnormal physical appearance, and all eggs with a "musty," "sour," "mouldy," "putrid" or any other odor than that of the normal egg.

Regulation 2. All egg breaking establishments shall consist of at least the following distinct and separate rooms:

- A candling room.
- A breaking room.
- A washing and sterilizing room.
- A freezing room.

The *candling room* must be separated from the breaking room, but may adjoin the latter, if provided with a tightly fitting door or similar opening. The floor should be of water proof construction, with a suitable drain. There shall be provided ample receptacles to hold all rejected eggs as indicated by Regulation 1.

For "leakers" there shall be provided approved metal trays. It is recommended that all other candled eggs be placed in metal pails or boxes, before sending them to the breaking room.

All eggs must be candled with care, using a single and double orifice candle. Every precaution must be taken to keep those eggs classed as unfit for human food out of the breaking room.

The breaking room shall have walls and ceiling of a white enamel, tile, paint or other waterproof covering. The floor must be impervious to water and supplied with drains. The intersection of the walls and floor should be finished in the so-called sanitary or cove finish. Every effort should be made to supply this room with the greatest amount of daylight. All windows and other exterior openings must be adequately covered to keep out flies, dust and dirt.

Tables must be made of metal, porcelain or other impervious material, or covered with a similar material. All eggs must be broken on detachable metal knives and the contents of the shell emptied into a glass, metal or other approved cup. A careful examination for appearance and odor shall be made of these eggs by competent people. If satisfactory, the eggs may be placed in the receptacle intended for good eggs. If any of the eggs in the cup are not of the classes permitted for human food, the cup and contents and knives shall be removed to the washing room and properly sterilized apparatus shall be substituted. Before receiving the clean equipment, the egg breaker shall wash

and dry her hands at a wash basin provided for that purpose, in the breaking room.

The separating of yolks and whites "by hand" is strictly prohibited. Such separation must be effected by a sanitary mechanical device.

All employes in the egg breaking room shall wear clean white caps and outer garments of a washable material.

Washing and Sterilizing Room: It should be provided with a waterproof floor, ample daylight, hot and cold water and live steam. There shall be adequate facilities for the washing, rinsing and sterilizing of all utensils, containers, etc. All vats, receptacles, implements, etc., shall be thoroughly washed and sterilized before using, and all floors and tables shall be scrubbed at least once daily.

Refrigerator Room: Ample facilities shall be provided at each egg breaking establishment for the immediate cooling and freezing of the liquid egg product. Only after said products have congealed may they be removed to a public cold storage warehouse or other establishment of similar nature.

Labeling: All cans, containers, vessels or packages of the frozen, dessicated or other egg product shall be distinctly labeled, marked or branded with the true name of the article, with the name and address of the manufacturer, or dealer and with the following statement: Illinois License No.

The label on each package of these eggs should either bear the date on which the product was prepared or a lot number. In the latter case the establishment should preserve its records so that the State Food Commissioner or his agent may trace from the lot number the date and other information regarding the product in question.

The Food Department will not assume responsibility for any claims of grade made by any egg breaking establishment.

The fact that an egg product was prepared in a licensed egg breaking establishment does not constitute exemption from all the provisions of the Food and Dairy Act.

TO CONTROL INTER-STATE SHIPMENT OF ADULTERATED EGGS.

Department of Agriculture Gives Notice that Shipments Containing More
Than Five Per Cent of Bad Eggs Will Be Regarded as Violating
the Food and Drugs Act—Suggests That Country
Shippers Candle Eggs Intended for
Interstate Commerce.

The United States Department of Agriculture has had under consideration for some time the application of the Federal Food and Drugs Act to the shipment in interstate commerce of eggs in the shell, especially the two classes of eggs known in the trade as "current receipts" and as "rejects" from candling rooms. "Current receipts" contain at different seasons of the year varying proportions of eggs which are filthy, decomposed, or putrid. "Rejects" from candling rooms, as a rule, contain large proportions of eggs which are filthy, decomposed, or putrid, and very small proportions of eggs suitable for consumption.

Under the Federal Food and Drugs Act, eggs, in common with other articles of food, are adulterated if they consist wholly or in part of a filthy, decomposed, or putrid substance. Section 2 of the Act prohibits the shipment in interstate commerce of foods which are adulterated and it is plain that this prohibition applies to the shipment in interstate commerce of "current receipts" or of "rejects" from candling rooms or of any other grade of eggs in the shell unless the filthy, decomposed, or putrid eggs have been removed.

In the opinion of the Department, eggs which contain yolks stuck to the shell, moldy eggs, black spots, mixed rots, addled eggs, black rots, and any other eggs which consist wholly or in part of a filthy, decomposed, or putrid substance, are adulterated.

The investigations of the Department have shown that it is commercially practicable, by the method of candling, to eliminate from any given shipment most of the eggs of the kinds which

the Department regards as adulterated. It is not the practice of the Department, however, to base proceedings under the Food and Drugs Act on shipments of eggs unless there are present larger percentages of bad eggs than are ordinarily present in recognized commercial grades of candled eggs. The Department is informed that cases of eggs are not allowed to receive even the lowest candled egg grades if the cases contain more than one and one-half dozen or 5 per cent of bad eggs. Country shippers who are not certain of the freshness of their eggs should candle them before shipping them in interstate commerce.

Bad Eggs Must Be Denatured.

Eggs which are adulterated may be shipped in interstate or foreign commerce for use in tanning or other technical ways without violating the provisions of the Food and Drugs Act only if they are first denatured so as to render them incapable of being used for food. Since it is impracticable to denature eggs in the shell, adulterated shell eggs must be broken out and denatured prior to shipment. The views of the Department with respect to the denaturing of eggs are stated in Bureau of Chemistry Service and Regulatory Announcements No. 7, paragraph 19, and No. 12, opinion 102.

YEAR ROUND FEEDING OF DAIRY COWS.

By C. H. Eckles, Professor of Dairy Husbandry, University of Missouri.
Written for the DeLaval Separator Co.'s Dairy Hand Book.

No amount of feed or skill in handling will make a profitable cow out of one that does not inherit a strong tendency to give milk. This is why success with dairy cows depends so largely upon selection of the individual animal by keeping records of milk and fat production. On the other hand no matter how good a producer a dairy cow may be by inheritance she cannot give results without the proper feed and management.

Every owner of a cow welcomes the time when the animal can be turned out to pasture because each cow is expected to give the best results of the year on grass. Immature grass, such as we have in early spring, contains a large amount of water and a small amount of dry matter. It is almost impossible for a heavy milking cow to eat enough of such feed to supply the necessary amount of nutrients.

Grain Feeding While on Pasture.—A cow will produce more milk if fed grain while on pasture. If a large yield is of more importance than economy of production, grain should certainly be fed. The cow that gives a small quantity of milk will produce but little more, if fed grain while on pasture. However, with the heavy producing cow the case is quite different and it is necessary that she be fed grain or she will not continue on the high level of production long. A Jersey cow that is giving as much as 20 pounds or 10 quarts a day, or a Holstein or Shorthorn giving 25 pounds or more daily should be given some grain. Our practice in regard to feeding on pasture is about as follows:

Jersey cow producing—

20 pounds milk daily	3 pounds grain
25 pounds milk daily	4 pounds grain
30 pounds milk daily	6 pounds grain
35 pounds milk daily	8 pounds grain
40 pounds milk daily	10 pounds grain

Holstein, Shorthorn or Ayrshire producing—

25 pounds milk daily	3 pounds grain
30 pounds milk daily	5 pounds grain
35 pounds milk daily	7 pounds grain
40 pounds milk daily	9 pounds grain
50 pounds milk daily	10 pounds grain

It must be kept in mind that this applies only when pastures are abundant.

Providing for Periods of Short Pasture.—As long as fresh pasture grasses are abundant, the ordinary cow is about as well provided for as she can be to produce milk economically. Unfortunately the season of abundant pasture is often short. In many localities, a dry period, often of several weeks, occurs during the middle or latter part of the summer and the pastures become short and insufficient to maintain a full flow of milk. This season is often the critical time of the year for the dairy cow. Probably as much loss occurs one year with another by lack of feed at this time as occurs from improper feeding during the winter.

It is possible to hold up the milk flow by heavy grain feeding but this is expensive. Provision should always be made to have green crops on hand that may be cut and fed when needed or to have silage available.

The Summer Silo.—The advantages of the silo for winter feeding are now generally known to dairy farmers. The next stage in silo development is now beginning. This is the use of silage for summer feeding. Over a large section of the United States there is a period sometime during the summer when pastures are short, young cattle are checked in growth and cows drop in milk. This is the time to open the summer silo. The

practical thing to do is to have two silos, one for winter feeding and one smaller in diameter for summer feeding. Farmers who were fortunate enough to have summer silos during the past few years are confident that sooner or later most farmers will have summer silos.

Amount of Feed.—The first condition given as typical of the summer feeding is an abundance of palatable food, and on this point is made one of the most common mistakes in feeding cows. In producing milk, the cow may be looked upon in a way as a milk producing machine which we supply with a certain amount of raw material in the form of feed, and this raw material is manufactured into milk. The same rule holds in running the milk manufacturing plant as would hold in the running of any other manufacturing plant; it is run most economically near its full capacity. Every one who feeds animals should thoroughly comprehend that, first of all, the animal must use a certain proportion of its food to maintain the body. This is the first requirement of the animal and it is the first use to which it puts its food.

In the case of an ordinary dairy cow the amount required to maintain the body is about 60% of the ration. In the case of a heavier producing animal the proportion of the ration used for this purpose is less. It should be clear that, after going to the expense of giving the animal the necessary amount to keep her alive, it is the poorest economy to refuse to furnish the other 40% or 50% which she would utilize exclusively for milk production.

The only way to feed a cow economically is to feed her liberally so she has the raw material to make into milk. Then if she does not deliver the goods she should be sent to the butcher. The farmer sometimes reasons that with higher priced feeds it does not pay to feed well. It certainly does not pay under such conditions to feed inferior cows liberally but such conditions make it all the more necessary to feed good cows enough to use all her milk producing ability.

Overfeeding.—In some herds light milkers are overfed. If a cow is already receiving sufficient feed for all the milk she is

producing it will do no good to give her more feed. It does not pay to give a cow producing 20 pounds daily the same amount of grain as one producing 40 or 50 pounds. If this is done the low milker is overfed and will give just as much milk if given less grain.

Amount of Grain and Roughage to Feed.—The only economical way is to feed cows according to the amount of milk produced. There certainly is anything but good judgment behind the common practice in many herds of feeding all the animals the same amount of grain. Under such conditions the high producing cows are underfed and the low milkers receive too much.

The cow should be fed practically all the roughness she will eat up clean. The difference in rations fed to different animals should be mostly in the grain. The following may serve as a general feeding guide:

1.—Feed all the roughness they will eat up clean at all times.

2.—Feed one pound of grain a day for each pound of butter-fat produced a week, or one pound grain for each three pounds of 5% milk or 4 pounds of 3.5% milk.

3.—Feed all the cows will take without gaining in weight.

The Balanced Ration.—The ordinary pasture grasses, especially blue grass when in the growing state, contain the proper portion of nutrients to enable a dairy cow to produce the maximum amount of milk of which she is capable. The winter ration, on the other hand, is liable to have these nutrients out of proportion. This is one point wherein common practice falls far short of continuing the summer conditions throughout the winter. The feeding of a ration not properly balanced is one of the most common mistakes made on the average farm.

All properly balanced rations must contain protein, carbohydrates and fat, and no amount of carbohydrates or fat can take the place in the body of protein. Since these three kinds of solids must be present in order to form milk, it is necessary to furnish them in the feed in sufficient quantities and in about the right proportion, so there will be no loss. When this is done, the ration is properly balanced. If a cow be supplied with suf-

ficient material in her feed to produce 30 pounds of milk a day, but on account of lacking protein produces but 15 pounds, it is useless to further increase the fat-producing material and expect the flow of milk to be increased. The surplus fat in the feed will not be put into the milk and make it unusually rich.

As an aid in properly balancing the rations, it is useful to divide our common feeds into two classes: Class 1, or those feeds which contain a large amount of fat producing material, carbohydrates and fat, but which are notably deficient in protein. In this class we have: corn, corn fodder, corn silage, timothy hay, oat straw, wheat straw, millet hay, sorghum hay.

Class 2 contains a much larger proportion of protein, the essential growth and milk producing elements, and smaller quantities of the fat making materials. It includes: clover hay, alfalfa hay, cowpea hay, bran, oats, cottonseed meal, gluten meal, linseed meal, soy beans.

A properly balanced ration will, therefore, include some of the feeds from each of these two lists. A ration of silage, timothy hay and corn is not a balanced ration. Neither is a ration of corn fodder, corn and oats. Both lack protein.

Legume Hays.—The cheapest source of protein is generally legume hays, including clover, alfalfa and cowpea hay. If an abundance of any one of these hays is on hand, the problem of making an economical balanced ration is very much simplified. The use of these hays makes it unnecessary to buy any large quantities of bran, oil meal or cottonseed meal for ordinary dairy cows, and makes it possible that the principal grain used be corn, which usually is our cheapest grain. Even cowpea or alfalfa hay alone, with corn for grain, makes a fairly good ration for an ordinary dairy cow, and such a ration could be substituted with good results for that of timothy hay and corn fodder. If hay is to be sold it should be timothy hay and not clover or cowpea hay.

Succulent Feeds.—By the term succulent feed is meant feed having that property possessed by green grass. Such feed has a value outside of the actual nutrients it contains on account of its favorable effect upon the digestion of the animal. There are two methods in use for supplying this succulent feed during the

winter season. One is the use of root crops and the other is the use of silage. In some parts of the world the use of root crops is almost universal, and is the solution of the problem. Where corn is grown the use of silage is more practical, however, than root crops.

What Concentrated Feeds Weigh.

FEED	Weight of One Quart	Pounds Measures
	Pounds	Quarts
Dried beet pulp .....	.55	1.8
Dried brewers' grains .....	.6	1.7
Corn and cob meal	1.4	.7
Corn and oat feed .....	.7	1.4
Corn bran .....	.5	2.0
Corn meal	1.5	.7
Corn, whole	1.7	.6
Cottonseed meal	1.5	.7
Cotton seed	1.	1.
Germ oil meal	1.4	.7
Gluten feed .....	.3	.8
Gluten feed	1.3	.8
Hominy meal	1.1	.9
Kafir meal	1.6	.6
Linseed meal (new process) .....	.9	1.1
Linseed meal (old process)	1.1	.9
Malt sprouts .....	.6	1.7
Wheat bran .....	.5	2.0
Wheat, ground	1.7	.6
Wheat middlings (flour)	1.2	.8
Wheat middlings (standard)	1.9	.5
Wheat, whole .....	.8	1.3

RATIONS FOR DAIRY COWS.

In the sample rations submitted below average conditions are considered. The quantity of grain may be increased or lessened in proportion to the milk yield. In general a cow should be fed one pound of grain for every three pounds of 5% milk yielded. If fed a bright legume hay and good silage and the milk averages around 3.3% to 3.5% butter-fat give one pound of grain to four or five pounds of milk. The several rations given below are in use in different parts of the country. Some are for cows yielding a heavy milk flow, others for cows yielding only a moderate amount. The roughage allotment may be fed to a cow in any state of milk lactation, but the grain may be increased or decreased in proportion as the milk yield is large or small.

Some Sample Dairy Rations.

1.	Corn silage 40 pounds Clover hay 15 pounds Ground corn 3 pounds Cottonseed meal..... 1 pound	2	Corn silage 40 pounds Timothy hay 15 pounds Ground corn 3 pounds Cottonseed meal 3 pounds Gluten meal 2 pounds
3	Soy bean silage 36 pounds Alfalfa hay 8 pounds Corn meal 6 pounds	4	Corn silage 36 pounds Corn stover 6 pounds Wheat bran 4 pounds Dried brewers' grains .. 4 pounds
5	Cowpea hay 17 pounds Corn silage..... 36 pounds Cottonseed meal 2 pounds	6	Corn stover 5 pounds Corn silage 36 pounds Wheat bran 4 pounds Dried brewers' grains .. 3 pounds Cottonseed meal 2 pounds
7	Mixed hay..... 5 pounds Corn silage..... 30 pounds Wheat bran 6 pounds	8	Crimson clover hay 10 pounds Cowpea hay 36 pounds Corn and cob meal..... 6 pounds

9	
Mixed hay	5 pounds
Corn silage.....	36 pounds
Dried brewers' grains ..	5 pounds

11	
Alfalfa hay	15 pounds
Corn silage	35 pounds
Corn meal	2 pounds
Gluten meal.....	1 pound

13	
Corn silage	50 pounds
Mixed hay	7 pounds
Linseed meal.....	2 pounds
Bran	2 pounds
Gluten meal	1 pound

15	
Corn silage	45 pounds
Wheat bran	4 pounds
Gluten meal	3 pounds
Corn meal	2 pounds
Linseed meal	1 pound

17	
Corn silage	40 pounds
Timothy hay	5 pounds
Ground oats	5 pounds
Ground peas	6 pounds

19	
Corn silage or roots....	25 pounds
Blue grass hay	12 pounds
Wheat bran	4 pounds
Gluten meal	3 pounds

21	
Corn stover	12 pounds
Chopped wheat	6 pounds
Linseed meal	5 pounds

23	
Corn stover	15 pounds
Alfalfa hay	10 pounds
Ground soy beans	2 pounds
Corn and cob meal	3 pounds
Linseed meal	1 pound

10	
Corn stover	7 pounds
Corn silage	40 pounds
Wheat bran	4 pounds
Gluten meal	4 pounds
Cottonseed meal	2 pounds

12	
Fodder corn	20 pounds
Ground oats	5 pounds
Wheat bran	3 pounds
Linseed meal	2 pounds

14	
Corn stover	5 pounds
Mixed hay	7 pounds
Linseed meal	2 pounds
Corn meal	5 pounds
Bran	6 pounds

16	
Corn stover	15 pounds
Wheat bran	4 pounds
Gluten meal	4 pounds
Corn meal	1 pound
Linseed meal	2 pounds

18	
Corn silage or roots ...	25 pounds
Gluten	3 pounds
Brewers' grains.....	3 pounds
Malt sprouts	2 pounds

20	
Corn silage	35 pounds
Alfalfa hay	10 pounds
Cottonseed meal	4.5 pounds
Oats	4.5 pounds
Barley	4.5 pounds

22	
Corn silage *.....	35 pounds
Cottonseed meal	3 pounds
Linseed meal	3 pounds
Wheat bran.....	2 pounds

24	
Corn Stover	15 pounds
Clover hay	10 pounds
Ground soy beans	3 pounds
Corn and cob meal	3 pounds
Linseed meal	2 pounds

25	
Clover hay	6 pounds
Corn stover	10 pounds
Ground oats	10 pounds
Corn meal	2 pounds

27	
Timothy hay	12 pounds
Rye meal	3 pounds
Cottonseed meal	3 pounds
Dried beet pulp	4 pounds
Gluten	2 pounds

29	
Corn silage	30 pounds
Alfalfa hay	10 pounds
Clover hay	10 pounds
Wheat bran	2 pounds
Corn meal	2 pounds

31	
Clover hay	8 pounds
Timothy hay	7 pounds
Corn and cob meal	12 pounds
Wheat bran	8 pounds
Linseed meal	2 pounds

33	
Common hay	20 pounds
Wheat bran	2 pounds
Cottonseed meal	2 pounds
Hominy meal.....	2 pounds

35	
Corn silage	40 pounds
Clover hay	3 pounds
Timothy hay	2 pounds
Corn and cob meal	8 pounds
Dried brewers' grains ..	12 pounds

37	
Corn fodder	25 pounds
Wheat bran	5 pounds
Corn meal	5 pounds
Cottonseed meal	3 pounds
Linseed meal	2 pounds

39	
Corn silage	30 pounds
Sorghum	12 pounds
Corn meal	1 pound
Cottonseed meal	3 pounds
Cotton seed	2 pounds

26	
Clover hay	6 pounds
Corn stover	10 pounds
Wheat bran	10 pounds
Corn meal	2 pounds

28	
Timothy hay	12 pounds
Barley meal	4 pounds
Dried beet pulp	5 pounds
Gluten meal	4 pounds
Linseed meal	2 pounds

30	
Corn silage	35 pounds
Hay	10 pounds
Wheat bran	3 pounds
Corn and cob meal	3 pounds
Cotton seed meal	2 pounds
Gluten meal	2 pounds

32	
Corn silage or roots ...	25 pounds
Corn meal	8 pounds
Wheat bran	2 pounds
Oats	4 pounds
Linseed meal	2 pounds

34	
Timothy hay	12 pounds
Wheat bran	1 pound
Middlings	1 pound
Corn meal	2 pounds
Cottonseed meal	3 pounds

36	
Corn silage	30 pounds
Fodder corn	8 pounds
Corn meal	3 pounds
Wheat bran	3 pounds
Cottonseed meal	2 pounds

38	
Corn fodder	10 pounds
Mixed hay	8 pounds
Wheat bran	3 pounds
Corn meal	2 pounds
Cottonseed meal	2 pounds
Gluten meal	3 pounds

40	
Corn silage.....	45 pounds
Corn and cob meal	2 pounds
Ground oats	3 pounds
Barley meal	3 pounds
Oat hay	5 pounds

41

Corn silage or roots ...	25 pounds
Clover hay	10 pounds
Timothy hay	5 pounds
Wheat middlings	8 pounds
Linseed meal	2 pounds

43

Corn silage	45 pounds
Sheaf oats	5 pounds
Corn fodder	5 pounds
Cottonseed meal	3 pounds
Linseed meal	2 pounds
Wheat bran	3 pounds
Dairy feed	3 pounds

42

Oat and pea hay.....	12 pounds
Clover hay	12 pounds
Wheat middlings	4 pounds
Dairy feed	4 pounds

44

Corn silage	40 pounds
Clover hay or alfalfa hay	7 pounds
Straw	3 pounds
Barley meal	2 pounds
Pea meal	2 pounds
Wheat bran	3 pounds
Dairy feed	3 pounds



LEGUMES FOR THE DAIRY.

By Prof. C. W. Burkett, Editor of American Agriculturist. (From
The DeLaval Separator Co. Dairy Hand Book).

The basis of the profitable dairy ration is undoubtedly hay and silage. To get the best returns from these and the greatest efficiency from the cow, grain feeds rich in protein must be supplied in addition. The cow must have a reasonable amount of protein in her ration if she is to do her full duty at the milk pail. Naturally, the less protein there is in the roughage feed the more that will need to be supplied in the grains. That means ordinarily that more grain will need to be fed. By lessening the quantity of grain fed, the greater will be the net profit; but the only way known of lessening the quantity of purchased grain is through the feeding of home grown roughage materials that are heavy carriers of protein.

Fortunately we have a class of farm crops that are relatively high in protein. These must be sought in the future to the fullest extent if the greatest profit is to be had from the production of milk, butter and cheese. I refer to the legume crops. The list includes alfalfa, the clovers, cowpeas, soy beans, the vetches and Canadian field peas. Alfalfa is only mentioned here since it has been treated elsewhere.

The Clovers Standard Everywhere.

In the clover class we have the common red clover, white clover, crimson clover or scarlet clover, Alsike clover, mammoth clover and Japan clover. In a general way Japan clover is limited to the southern section of the country. It is subject to injury from frost and is therefore a summer crop only. As a southern pasture grass it is unsurpassed. It grows on the poorest and barest red clay knobs, and on exhausted, gravelly or worn-out

sands, and at the same time produces fair grazing. It spreads rapidly and crowds out the common and worthless plants of the neighborhood. It is an annual and dies down each year, leaving its stems, leaves and roots to decay and enrich the soil. The seed produced remains on the soil ready for the following year. In starting the crop, scatter the seed broadcast and harrow lightly.

Crimson Clover.—This annual is most at home in the South and along the Atlantic seaboard. It grows successfully as far north as New Jersey and Long Island. It is sown in late summer or early fall and reaches maturity in the spring time of the following year. In the rotation system crimson clover should be grown as the catch crop. On preparing the soil the aim should be to secure a fine, compact and moist seed-bed. If the plowing be done just previous to seeding, the harrow and roller should be freely used so as to secure a compact bed. From 5 to 10 pounds of seed should be sowed to the acre.

Red Clover.—The seed may be sown broadcast by hand or by means of a hand seeder or with an attachment to the grain drill. From 5 to 10 pounds of seed are usually sown to the acre, the latter quantity being preferable. Clover may be included in any and all grass seedings. By the second year the clover disappears and then timothy, red top or other grasses included in the mixture are ready to start at their best. Its ability to grow in almost any place makes it a universal American crop. It can be adjusted to almost any system of crop rotation, and for this reason it should be more commonly grown than it is. The dairy farm that neglects clover suffers a great loss, not only in the admirable needs for the dairy stock, but through the fertility that might be provided to the land when silage and other pasture crops are grown.

Alsike Clover.—This plant compared with common red clover is characterized by a pinkish rather than a blush red tinge of its blossoms. Its roots are smaller. It produces less pasture after a season of maturity and also matures later than the common red varieties. It has a perennial rather than a biennial habit of growth. It feeds somewhat near to the surface and

therefore does not possess the drouth-resisting qualities of the stronger varieties of clover. Its range of distribution is more limited than the common red variety and it is better known in the northern states than in the southern states. It is especially fitted to clay soils, clay loams and bottom lands. If moisture is present it will do well on any soil. From three to five pounds of seed are used to the acre. It is frequently sown alone, but is most generally used in combination with other grasses. Acid soils do not affect it as they do the common red variety.

Mammoth Clover.—This strong, vigorous legume resembles the common variety in form and leaves and general habit of growth. The stems and heads are larger, it attains a greater height, matures later in the season and its roots are large and penetrate the soil to a great depth. It occupies the same place in the rotation and calls for the same methods of seeding and preparation as that given the common red variety. When sown alone the usual amount is 10 pounds of seed to the acre, but when sown in combination with other seeds this amount is proportionately reduced. The mammoth variety is more inclined to lodge and is more difficult to harvest and to cure than the other varieties. It yields a little heavier to the acre. The hay is coarser and is not so popular in dairy stables nor so much relished by animals. It is especially prized as a green manure.

White Clover.—This little perennial is pretty well established all over the country. It is best adapted to rather moist soils and restricted to lawns and permanent pastures; and always in combination with other crops. Its yield is small, but because of its perennial character and its creeping habit and its tendency to occupy all the waste spaces left vacant by other plants it deserves recognition in all permanent pastures used for dairy cattle.

Cowpeas, The Clover of the South.

What clover is to the North, the pea is to the South. On poor sandy land, with a few hundred pounds of fertilizer a crop of cowpeas can be grown that will simply astonish the visitor unused to them. Not only an abundance of choice grain can be made from them, but the hay one acre will yield will three times

pay the cost of the crop. The hay, if properly cured, is rich in nutrition. All classes of farm animals relish it and will gain in weight even though given no additional feed. The cowpea is not restricted to the South and does equally well in the North. The difference in the crop system has favored its culture in the southern states and the popularity of clover in the North has been against it. As a nitrogen gatherer, a humus maker and consumer of rough plant food, the cowpea is unexcelled. It is unequalled by any other plant unless it be alfalfa.

The cowpea responds to good tillage. A well-fined, loose seed-bed is the ideal one. Never plant until the ground is warm. Sow broadcast or with grain drill at the rate of one or two bushels to the acre. If planted in drills make rows about 24 to 30 inches apart. Cultivate a few times. This not only hastens the growth, but increases the yield considerably. The crop is cured for hay in a manner very similar to the curing of clover or alfalfa.

A Splendid Oriental Legume.

Soy beans, like the cowpea, want warm weather. Their uses are somewhat similar to those of the cowpea. They grow well in the corn field and when put into the silo with corn make admirable silage. They grow in a wide range of soils and may be planted in rows or broadcasted. When wanted mainly for grain the seed is put in rows about 24 inches apart for the small varieties and 36 inches for the large varieties. Once started they grow rapidly. If grown for grain this may be ground and fed in the regular grain mixture, and if made into hay, fed as cowpeas or clover. The high value of the seed acts against the use of soy beans as a grain food.

The Tares of the Cereals.

The vetches are called the tares of the cereals but are relished by live stock of all kinds. They are excellent for milk production and their fattening properties are of a high order. They have a special adaptation for being grown along with other grains to provide soiling food or hay. They may be used with

oats or wheat and when so grown the combination makes an admirable hay mixture, especially in those regions where clover, alfalfa or other hays are not generally grown. The vetches flourish best in moist, clay loam soils of free working texture. The spring vetch should be sown for forage as soon as the ground is dry enough to be worked without injury. The winter vetch ought to be sown long before winter to enable it to become firmly established that it may the better withstand the rigors of winter. The seeding may be broadcasted but it is better sown with a grain drill if sown alone or along with other seeds. It should be buried about as deeply as the cereal grains. The hay of the common vetch is about as nutritious as common clover and is relished even more. On account of the high value of seed it is never fed to live stock, although it is excellent food.

A Mixture For Soiling or Hay.

Oats and Canadian field peas seeded together make an admirable soiling mixture, or hay. The peas use the oats for support and when cut in the green state both are at their best. The chief value of the Canadian pea is for forage. They like a porous moist clay loam. About two bushels of oats and one bushel of peas are used to the acre. They may be mixed before seeding and sown broadcast or with a drill. The peas do better if deeply covered. Some growers first disk in the peas to a depth of three or four inches and then seed the oats by hand or a grain drill. When grown as a dual crop the harvesting is done about the time the oats are in milk stage. As a hay it is both appetizing and nutritious, and as a food for dairy cows is unsurpassed. In many dairy sections the custom prevails of seeding each spring a small acreage to oats and peas to get an early soiling crop. When the crop reaches a height of a couple feet daily cuttings are made and these are given to the cows as green forage. If the clover or alfalfa crops are available, or the pasture is ready before all the oats and peas are used up, it is customary to cut the remaining part for hay.

ALFALFA THE WONDERFUL.

By Hon. F. D. Coburn, Former Secretary Kansas Department of Agriculture.—(From The DeLaval Separator Co.'s Dairy Hand Book.

Most of the supposed drawbacks of alfalfa growing are in a large measure imaginary. This is in spite of the lack of lime in some soils, or excessive rains in haying time; in spite of severe winter temperature in the North and unpromising soil conditions somewhere else, and in the face of Grandpa's justifiably high opinion of clover. Yet, no inference should be drawn from such a statement that alfalfa flourishes or survives alike in all places.

The Wisconsin Experiment Station says an acre of alfalfa will yield three times as much protein as an acre of clover, nine times as much as an acre of timothy, and twelve times as much as an acre of broom grass. A recent experiment at the Illinois station showed that for dairy cows a ration containing 10 pounds of alfalfa produced 17% more milk than the same ration with timothy used in lieu of alfalfa. Also that "alfalfa was worth \$10.86 more a ton than timothy, and when timothy is worth \$10 a ton an acre of alfalfa is worth \$68.44 more than an acre of timothy under the conditions which existed in this experiment and when milk is sold at \$1.30 a 100 pounds."

While unequalled as a hay or forage for all classes of farm animals, including fowls, to no farmer is alfalfa more essential than to the dairyman. Wheat bran, so long his reliance as the one best adjunct to other feeds in milk-making, has, on account of its high price, and poor quality due to modern methods of milling, made some less expensive substitute a necessity, and such a substitute is afforded by alfalfa, which as hay or ensilage, more nearly approaches bran than any other feed available.

Corn silage and alfalfa make in themselves practically a complete balanced ration for dairy cows. Alfalfa hay fed to

animals has much the same laxative effect on them as June pasture. A dairyman at Elgin, Ill., having 50 cows, says that every month's feeding of alfalfa in winter gives him a month of practically pasture conditions. "The cows show the pasture-effect in the glossy condition of their hair and in the yield of milk, and have never before looked quite so well."

Remarkable plant that it is, yielding under widely varying conditions well-nigh incredible growths of incomparable forage, some brains are requisite to success in its growth. To say that "any fool can grow alfalfa" is quite misleading, but with fair treatment under fairly favorable conditions it is bringing good fortune to thousands of those growers who know it best and use a fair intelligence in their dealings with it. Among its fundamental requirements is a fairly fertile soil, always—which it improves rather than depletes—free from weed seeds, in good tilth, with a surface painstakingly prepared. Alfalfa roots go down where those of no other plants go, and reaching the moisture, the mineral and other elements in the subsoils, bring them to the surface.

As a fertilizer alfalfa roots work most astonishing changes in the soil. They push their downward way in every direction, honeycombing the land with their growth; in the eventual process of decay some of them are all the time dying, and plowing up an alfalfa field one finds the subsoil filled with their decaying matter, leaving humus below where any other agencies have put it. It is there for future use, and the soil is filled with perforations through which the rains percolate, carrying with them other fertilization from the surface.

Alfalfa is not primarily a pasture crop; cattle, sheep and ruminants—animals that chew the cud—grazing on it will almost invariably bloat, and probably die, if they do not have prompt attention. Horses, hogs and animals that do not chew the cud, can graze on it without danger. Further, it is almost too valuable for pasture; that is, it can be utilized to greater profit in other ways. One of these is to mow and feed it uncured. If so used, slightly wilted, nothing bloats from eating it. Cured as hay, it does no harm to anything that eats it. One can have

a piece of land in alfalfa and keep cutting it from one side to the other, and maintain it fresh all the time; when he gets through from one side of the field, the other side is ready to cut again, and it can be profitably used with very excellent results in that way. Properly, a man should probably have part of his farm in alfalfa while he is raising other crops on the other part, and after a field has been in alfalfa for four or five years, he should plow it up, plant those other crops on the alfalfa ground, sow the rest of the land in alfalfa, and follow that sort of rotation.

Wherever fall seeding is found to do well it is generally conceded preferable. This means in a general way sowing, say in August or September. And with all conditions favoring, the first half of the month, or earlier, is best. Whatever the time selected the largest measure of success comes to the farmer who has made proper preparations. Fall sowing has a number of advantages peculiarly its own. First, no time is lost in the producing record, for sowing then two or three cuttings will be had the following season, while with spring sowing it is often a struggle for existence in the first year, owing to weeds and the dry weather while the plants have as yet but a feeble root hold. That fall-sown continues its growth promptly in the spring and naturally stands a good chance to smother the weeds, the great foes to establishing alfalfa; the frequent mowings also help in their extermination. Another feature is that the small, delicate alfalfa plant, and there are few more delicate at first, in its earlier stages obtains its nourishment from the surface soil, and hence the cleaner the ground the more plant-food there is available to the alfalfa, and the thriftier the growth. Incidentally, it is largely for this reason, too, that alfalfa should not be sown with a nurse crop.

The quantity of seed to sow per acre is much in dispute. Twenty pounds is the maximum, which is advised on the theory that it is better to sow too much rather than too little, and especially considering the chances there are that from one cause or another so many of the seeds or plants may prove failures. As a matter of fact, however, if each seed in twenty pounds grew on a single acre, that acre would have ten times as many plants as could thrive or survive.

Quality in seed should be carefully looked after, and the percentage of germinability and purity ascertained before buying. If the farmer does not have faith in his own ability to properly make these tests he may have them made without charge by sending samples to his state experiment station. The average seed on the markets is likely to be found with heavy admixtures of trash and the seeds of many noxious weeds as well as those of other plants. The best seed has a bright golden or egg-yellow color, with a glossy appearance, and 90% should grow.

Sowing may be done by broadcasting and the seed covered by harrowing, or with grain drills; an inch of fine, firmed soil is the ideal depth and covering. Many prefer planting with drills having a press-wheel attachment, as with this the depth can be regulated. Some are partial to running the drill across the land in one direction, sowing half the seed, and cross-drilling with the other half, thus avoiding "skips" in the stand. It is probably advisable to use either the portable seeder or the drill, for with the former a more even distribution can be had than if the sowing is done by hand, the seeder to be followed by thorough harrowing, while sowing with a drill makes it certain that the seeds are in instead of on top of the ground. Of late a grain drill adjustable to making seed rows three instead of six or eight inches apart is finding considerable favor. When it is used cross-drilling is not necessary.

For success alfalfa must have in its soil certain bacteria that are common to few other plants, but sweet clover is one of those having the same inoculation. When alfalfa is planted in a field where none has grown before, it is wise to introduce some of the right bacteria. The process is simple. Soil from ground on which alfalfa or sweet clover is growing luxuriously and where the nodules in which they multiply show that it contains the desired bacteria, is scattered broadcast, at the rate of 200 to 500 pounds or more per acre, and harrowed in, just before or after sowing seed. If the soil is sour 500 to 1000 pounds of lime per acre is a corrective, and a liberal coating of manure once in two or three years is a wonderful tonic to its growth.

Alfalfa should be mown for hay when it begins to bloom.

or when the new shoots at the root-crowns are well started. Harvested thus early a higher feeding value is obtained, and by promptly taking off the crop there is no check to the subsequent growth. If let stand until in full bloom, the oncoming "shoots" are in danger of being mowed off, thereby arresting their progress and delaying their maturity. This may mean one less cutting in the season. Also, there is greater loss of leaves when the plants are left too long uncut.

It is better to mow alfalfa after the dew is off, and it is always important to rake before the leaves become dry and crumbly. It is through the leaves that the sap in the plant is evaporated in curing; if they are too quickly dried by the hot sun this evaporation is made impossible, and a poor grade of hay will be had. Forking up the windrows into rather high, narrow cocks, possibly the same day as cut, is found excellent. Cocked like this, moderate rain the following night would do it little, if any, harm, as the partly cured hay will turn water quite well. With good weather the next day the cocks can be opened after the dew is off, possibly turned over, and in the afternoon may be fit for stacking.

Good practice is to stack as soon as it is ready. A simple test as to fitness is to tightly twist a wisp of the moist hay, and if no juice exudes it is ready, otherwise it should be further cured. After a barn the next best place for storing is in a purposely constructed shed. But by far the most of the hay in the prominent hay-producing states is stacked out-of-doors. Hence the kind of stack is important. Not infrequently as much as one-fifth or one-fourth is spoiled because of carelessness in this regard. One of the farmer's best investments is the hay barn, and its prominence in thrifty communities is testimony to its worth.

PASTEURIZATION OF CREAM FOR BUTTERMAKING.

(Issued by Minnesota State Dairy and Food Department.)

Pasteurization of cream for buttermaking has already been practiced for a number of years by buttermakers in this and other states, but the results obtained have varied a great deal, due to lack of uniform methods as well as to variation in conditions under which pasteurization has been applied, and there are some unfavorable conditions connected with creamery operation which must be corrected before it will be possible to obtain satisfactory results from pasteurization.

The object of this bulletin is not to lay down any hard and fast rules which, if followed, will insure the success of pasteurization, but it is our idea to discuss in a general way the factors influencing results and to convey to the reader some information regarding conditions and methods which give promise of the best results.

What is Pasteurization?

Pasteurization, as applied to buttermaking, is a process of heating cream to a temperature which destroys practically all germ life and then cooling quickly to ripening temperature or lower. It is not a cure for all existing evils, due to indifference on the part of cream producers, and, while proper pasteurization will improve the quality of butter made from both sweet and sour cream, it will not make it possible to produce high grade butter from raw material of indifferent quality.

The general adoption of pasteurization in buttermaking will have a tendency to encourage the grading of cream and paying for same according to quality, and grading cream, again, will make it possible to obtain better results from pasteurization than is possible under a system of mixing all grades of cream when delivered at the creamery.

Object of Pasteurization.

The object of pasteurization is to destroy undesirable germs and make a more uniform butter of better keeping quality, thus producing a more desirable product from the consumer's standpoint. Many creameries have neglected to pasteurize in the past because there was no immediate increase in price for pasteurized butter, and, while the primary object of pasteurization from the producer's standpoint is to obtain a better price for butter, it is well to remember that the value of pasteurization must first be demonstrated to the buyer, as well as to the dealer and consumer, before a better price can be expected.

One reason why many buyers of butter do not advise the creameries to pasteurize is that so much poor pasteurization has been done. This, however, is not the fault of pasteurization but an indication that pasteurization has not been properly applied. When cream is properly pasteurized, it generally results in an improvement of the finished product, and a number of creameries are receiving from one-half to two cents per pound more for their butter because of efficient pasteurization.

As the value of pasteurization is being constantly brought to the attention of butter consumers, there is sure to be an increased demand for pasteurized butter, and the creameries of the country should aim to satisfy this demand, even if it has to be done without increase in price.

Butter must always continue to meet the competition of cheaper substitutes, and this can best be done by keeping the quality of butter up to the highest possible standard, and if proper pasteurization will assist in making a better and more desirable product, it is good business on the part of the creameries to employ it where conditions will permit, and the question of who bears the extra expense should be given little consideration.

Necessary Conditions.

To obtain satisfactory results from pasteurization, it is necessary that cream be delivered with some regularity, and the average test of cream should be from 25 to 35 per cent butter-

fat, the latter being close to the ideal test of cream for pasteurization.

A creamery must be equipped with a continuous pasteurizer and cooler of ample capacity, or else have a modern ripener with large heating and cooling capacity.

The power plant must be large enough to furnish the necessary steam and power, and a liberal supply of cold water, in addition to ice or artificial refrigeration, is a great advantage.

The buttermaker must understand pasteurization in all its details, and an attempt to pasteurize without a skilled man in charge is sure to meet with failure.

Method of Delivery.

The method of delivery will have much to do with the results obtained by pasteurization, and it is difficult to pasteurize and obtain good results when cream is delivered at all hours of the day. When cream is received all day, it will be found most practical to start pasteurizing about three o'clock in the afternoon and then cool all cream received after that hour and hold it over until the next day. When a large amount of all kinds of cream is received at all hours of the day, it may be advisable to employ a double crew of men, in order that cream arriving late in the afternoon may be pasteurized and cooled in the evening, which would be better than to cool and hold it over night to be pasteurized the next day.

Regular Delivery.

Much better results can be obtained, of course, where cream is delivered on regular days and before a certain hour, as the buttermaker will then have a chance to pasteurize all cream the day it is received, and he will also know approximately how much cream will be delivered and have a chance to prepare the necessary amount of starter ready to add to the cream after pasteurization. In the case of sour cream, it is not necessary to ripen it for any length of time, but it is advisable to cool to churning temperature soon after pasteurizing.

Those who wish to make only the very best butter will find it necessary to have all the cream delivered sweet before ten or

eleven in the forenoon in order that it may be pasteurized while it is yet sweet. This method of delivery also gives time to ripen the cream with a good starter and have it cooled down to churning temperature before evening.

Thin Cream.

Thin cream is one of the difficulties with which the butter-maker has to deal when pasteurizing and the objections to it are so many that it becomes almost as much of a problem as poor quality. *It is impractical to pasteurize thin cream*, and this is especially true when it contains from .3 to .4 per cent of acid, as such cream will curdle very easily when heated and the loss in the buttermilk will be excessive. Thin cream also has a tendency to make salvy and poor-bodied butter, which again affects the flavor and keeping quality. Thin cream requires more vat capacity, more steam to heat, more water and ice to cool, more churn capacity, more time and power to churn; it does not permit the use of a large starter, as it is already too thin for good churning. The farmer, also, loses by producing thin cream. He first loses a lot of good skim milk and, in addition, he has more cream to cool, and more to handle and haul to the creamery. In fact thin cream is a disadvantage from every point of view. Cream testing around 20 per cent is worth two cents less per pound of fat than is cream testing around 30 per cent, and why not pay less for it?

Pay Less For This Cream.

A creamery troubled with thin cream should pay two cents less per pound of fat for cream averaging less than 25% for the month, as it is the only way to make the producer understand the disadvantage of delivering thin cream.

Different Methods.

Two methods of pasteurization are in general use, viz., the continuous or flash method, and the intermittent or vat method.

With the continuous or flash method, the cream flows through the pasteurizer in a continuous stream, and is rapidly

heated up to a temperature of 180 degrees F., and from the pasteurizer the cream is passed over the cooling coil, lowering the temperature quickly to the ripening point or below.

With the intermittent or vat method, the cream is first heated in the ripener to a temperature of 143 degrees F., held at this temperature about 20 minutes, and then cooled as quickly as possible to ripening temperature or lower.

Continuous Method.

The continuous or flash method is well adapted, where the milk or cream is received during two or three hours in the forenoon and where the run is large enough to employ two or more men.

FOREWARMER.—With this method, a 200 gallon forewarmer, with a self-circulating coil, should be used as a receiving vat, which makes it possible to thoroughly mix the cream and also heat it to from 100 to 115 degrees F., before it passes through the pasteurizer. The forewarmer will do away with all foaming in cold weather and will greatly increase the capacity of the pasteurizer. This mixing and heating in the forewarmer will also lessen the danger of curdling if a can of slightly sour cream should accidentally be taken in.

ONE STARTER CAN.—With this system, only one starter can is needed, as the starter may be placed in the vat before the patrons come in the morning, and the can may be washed and made ready for use again.

FORENOON DELIVERY.—This method of receiving cream before a certain hour in the forenoon, is by far the best from a quality standpoint, and we find that most of the creameries making fancy butter insist on this method of delivery. When cream is delivered in the above manner, and the continuous method of pasteurizing is used, the buttermaker has the best possible chance to ripen and cool the cream. The ripening process starts as soon as any cream reaches the ripener, and the required amount of acid will usually be developed in a few hours after all the cream is pasteurized, and it may then be cooled to churn-

ing temperature or lower and held over night, to be churned early the next morning; or the churning may be done late in the afternoon, if the buttermaker prefers.

TEMPERATURE.—With the continuous method, cream should be heated from 176 to 185 degrees F., and from the pasteurizer the cream should pass over a liberal sized cooler and the temperature lowered to the ripening point, which would be from 60 to 70 degrees F., depending upon the quality of cream and ripening method employed.

COOLING.—It is always advisable to use a cooler of large capacity, as it requires less water for cooling than does a smaller one. The large cooler also gives the buttermaker better control of temperatures, as he may raise or lower it by running more or less water through the cooler.

UNIFORM TEMPERATURES IMPORTANT.—When using a continuous pasteurizer to full capacity, the temperature should not be allowed to fall below 176 degrees, as a lower temperature has a tendency to produce rancid butter and would also lack efficiency in destroying bacteria. It is seldom advisable to heat above 185 degrees, as a higher temperature may cause a burnt flavor or promote a metallic flavor in the butter. Too great a variation in pasteurizing temperatures will also increase the losses in buttermilk. When a pasteurizer is not operated to full capacity, the temperature should be slightly lower than above mentioned, as the cream will not pass through the pasteurizer so rapidly, thus keeping it at a high temperature for a longer period, which has a tendency to weaken the body of the butter and increase the danger of burnt flavor.

HOT WATER OR DRY STEAM.—There is a difference of opinion among buttermakers as to whether hot water or dry steam should be used in operating a continuous pasteurizer, and, in order to obtain some information along this line, we carried on some experiments at the State Creamery and found that, when using dry steam, the capacity of the pasteurizer was increased from 8 to 10 per cent. We also noticed that dry steam caused the cream to burn on a trifle more than was the case with

hot water, though this was not enough to cause any serious objection to the use of dry steam.

SPEED.—The capacity of the continuous pasteurizer may be slightly enlarged by increasing the speed of the machine, as the higher speed causes the cream to revolve faster and in a thinner layer. However, it is best to follow closely the speed recommended by the manufacturer. The speed must at all times be high enough to elevate the cream from pasteurizer to cooler.

CAPACITY.—The capacity of continuous pasteurizers is overrated from 30 to 60 per cent, and it is well to keep this in mind when buying. It is possible that most pasteurizers will heat the rated amount if milk is handled. When buying a pasteurizer, it is advisable to buy a machine large enough to do the work without crowding, and the same is true of a cooler. It may cost a little more to buy the larger equipment, but it will be cheapest in the long run and give the best results.

The Vat Method.

The intermittent or vat method of pasteurization may be successfully used under all conditions where pasteurization is practicable. It may be used in the creamery where regular delivery is practiced, and it is the most practical method where cream is delivered with less regularity. The vat method is well adapted to conditions that may exist in different localities, and it has certain advantages over the continuous method.

TEMPERATURE.—With this method, the cream is heated to 143 degrees F., and is held at this temperature for 20 minutes before being cooled to ripening temperature. If all the cream is sweet, it should be heated as rapidly as possible, while, if the cream is more or less sour, it is advisable to heat slowly up to 115 degrees and then heat as rapidly as possible to 143 degrees F.

It is not advisable to start pasteurizing until all the cream to be heated is in the ripener, and no cream should be added after the temperature is above 75 degrees. Any cream arriving too late to be pasteurized that day should be cooled and held over until the next day.

TWO STARTER CANS.—When a large amount of cream is handled with the vat method, it may be necessary to have two starter cans, as the starter cannot be transferred to the ripener early in the morning. The cream must first be heated and cooled before starter is added, and it may be late in the afternoon before the starter can be added to the cream. But if two starter cans are used, the starter may remain in the can until it is needed, and there will be no interference with the preparation of the starter for the next day.

SPEED.—It is important that the ripener coil run at proper speed, and the best results cannot be had if the coil runs too slow or too fast. A speed of 40 to 45 revolutions a minute has been found to give best results.

STEAM AND WATER CONNECTIONS.—The steam and water connections to the ripener should be sufficiently large to admit steam and water fast enough for rapid heating and cooling. With sufficient steam and water and large pipe connections to the ripener, it should not require more than 20 to 30 minutes to heat a vat of cream, while the cooling process will take somewhat longer.

Many creameries have altogether too small steam pipes from boiler to vat and, with low pressure on the boiler, it is not to be wondered at that it often requires from one to two hours to heat a vat of cream, while a little work and expense in changing the pipe lines would often make pasteurization more practical and efficient.

When steam is piped direct to the front end of the ripener, there is often considerable trouble from cream burning onto the ripener coil. This may be avoided by piping the steam into the tank at rear end of vat.

Exhaust Steam.

In creameries using steam power, it is both practical and economical to utilize the exhaust steam for pasteurizing the cream. Where exhaust steam is allowed to go to waste, it will mean quite a saving to use it in pasteurizing. Exhaust steam can be used for both continuous and vat methods, but satis-

factory results cannot be had unless the exhaust pipes leading to the pasteurizer are of the proper size. A one and one-half inch or larger steam pipe should be used when heating with exhaust in the continuous pasteurizer, and it is necessary to have the steam inlet on the pasteurizer of the same size as the pipe carrying the exhaust steam. If the exhaust pipe and steam inlet on the pasteurizer are large enough, it will be less trouble to keep a uniform temperature than when live steam is used, because the exhaust steam does not vary like the pressure on the boiler. When the pasteurizer is some distance from the engine, it is necessary to use a larger exhaust pipe than when the steam travels a shorter distance.

Where the vat method of pasteurization is used, the exhaust steam can be piped direct from engine to water tank at rear end of ripener. A two inch pipe will usually be large enough, and the end that is under water should be capped and perforated with about 30 or 40 five-eighth inch holes, which will reduce the noise to a minimum.

If the oil from the exhaust steam is objectionable, because of coloring the floor, an oil trap may be used near the engine. This trap will catch practically all the oil, leaving the exhaust nearly as clean as live steam.

Creameries using one of the exhaust water heaters described in our Bulletin No. 54 may also use the hot water from this heater for pasteurizing in the ripener, provided they have occasion to operate the engine a short time before pasteurizing, to heat the water to near boiling point. This hot water can be circulated through the ripener coil by gravity, and with a pump it is returned to the heater. Nothing smaller than 1¼ inch pipes should be used in the pipe lines between heater and ripener, as too small pipes do not allow enough hot water to pass through the ripener coil, and the result is slow and unsatisfactory pasteurization.

Sweet Cream.

Sweet cream of a fair average test may be pasteurized by either the continuous or the vat method without any trouble

whatsoever and, while sweet cream can be made into fine butter without pasteurization, there can be no doubt that the keeping quality of butter is improved thereby. Pasteurization will also greatly aid in making a uniform product from day to day and, considering the importance of uniformity, this alone should be sufficient inducement to creameries to pasteurize, even though all the cream is sweet when received.

Sour Cream.

Experiments in pasteurization indicate that more germs are killed in sour cream than in sweet. This is due to the fact that heat plus acid is more fatal to organisms than is heat without acid.

If all the cream is sour when received, it can be pasteurized without difficulty providing it contains a liberal percentage of fat and is well mixed before heat is applied. All cream should be strained through a fine mesh wire strainer when received, as this will help to break up the cream and remove any free casein. Thin and lumpy cream is sure to give trouble when pasteurizing, and these conditions must be overcome in order to obtain satisfactory results from pasteurization. Quite a number of creameries have been in the habit of pasteurizing in winter and discontinuing it at the approach of warm weather, evidently because buttermakers believe that sour cream was difficult to pasteurize. The fact of the matter is, however, that there is ordinarily less trouble pasteurizing in summer than in winter, as the cream is more uniformly sour in hot weather than during the colder season.

If reasonably sweet cream is received during the winter months there will, of course, be little trouble in pasteurizing it, but with the approach of spring and warmer weather, some sour cream will be coming in, and that is when troubles in pasteurizing are most pronounced.

Sweet and Sour Cream.

Mixed sweet and sour cream is the cause of most of the difficulties encountered by buttermakers in pasteurizing cream for buttermaking. As has already been stated, it is possible to

pasteurize all sweet or all sour cream without much trouble, but it is the mixing of sweet and sour cream that causes curdling and excessive losses in the buttermilk, as well as a mealy condition in the body of the butter.

The curdling of cream during pasteurization and excessive losses in the buttermilk are the two main difficulties met with in pasteurizing, and the two usually go hand in hand: when curdling of cream occurs, it always results in excessive losses in the buttermilk, and excessive losses in buttermilk seldom occur if proper churning temperatures are used, except when the cream curdles during pasteurization.

The curdling or coagulation of mixed sweet and sour cream is due to a combination of the action of the acid in sour cream upon the casein in sweet cream in the presence of heat. The mixing of sweet and sour cream does not alone cause curdling, but when the casein in sweet cream is subjected to the action of the lactic acid in sour cream for a short time, it seems to become sticky, and when a temperature of close to 125 degrees F., is reached, the curdling or coagulation takes place. Thus, it will be seen that the sweet cream curdles and not the sour cream, as many buttermakers seem to believe.

Remember, it is the combination of the action of the lactic acid on the sweet curd for a short time, together with a temperature of 125 degrees, that causes curdling. Either one separately does not cause the curdling; it is the contamination of the two.

When cream curdles during pasteurization, it always causes an abnormal loss of fat in the buttermilk. This is due to the particles of casein adhering when in a sticky condition, these clusters of casein again enclosing particles of fat which are not liberated during the process of churning.

The big problem confronting the buttermaker is how to handle his cream so as to pasteurize it without curdling. We will suggest several methods and then let the buttermaker judge which is most practical under his conditions. The sweet and sour cream may be pasteurized separately if the run is large enough to make this practicable. If this is done, we would

suggest that the sweet cream be ripened with a good starter before the pasteurized sour cream is added, or, still better, the sweet and sour cream can be ripened and churned separately, though with a small run this is hardly practicable.

If the sweet and sour cream is mixed when received, it should be ripened for 30 minutes to two hours before it is pasteurized. This allows the sweet curd to be acted upon by the lactic acid in the sour cream, making the whole mass of an even acid content. By ripening in this way, the cream would be beyond the curdling point and may be pasteurized without any trouble. The length of time cream should be allowed to stand before pasteurizing will depend upon the percentage of sweet and sour cream, as well as on the temperature at which the cream is held. The best guide in these matters is experience, and the buttermaker should change his methods to conform with the conditions under which he is working.

We are ready to agree with any buttermaker that this ripening of sweet and sour cream before pasteurization is not going to help the quality. Especially is this true if the sour cream is of poor quality, and we recommend this method only where it is impossible to grade the cream and handle it separately.

When the vat method is used in pasteurizing sour cream, the cream should first be heated to about 115 degrees F., and then held at or near this temperature for a short time. The temperature should then be raised as rapidly as possible to 143 degrees F.

The length of time at which cream should be held at 115 degrees depends on the amount of its acidity. The reason cream should be held at 115 degrees is that this holding process will assist in hardening the casein, thus overcoming the sticky condition of the casein, which causes curdling. The casein in high acid cream will harden more rapidly than the casein in cream containing less acid, and therefore it is not necessary to hold high acid cream as long as cream containing less acid. Cream is most liable to curdle when it contains from .30 to .45% of acid.

The curdling of cream takes place when the temperature

reaches close to 125 degrees, and it is important that this point be passed very rapidly, as there is less danger of curdling with quick heating than when a slower method is applied. When using the continuous pasteurizer, some kind of a forewarmer and mixer should be used, and the cream should be heated to from 100 to 115 degrees before going through the pasteurizer. This or some similar method, is advisable in pasteurizing all kinds of cream, and it is absolutely necessary to use some kind of a forewarmer and mixer with the continuous pasteurizer when sour cream is handled. With this method the cream should be heated to about 180 degrees F.

Cost of Equipment.

The cost of equipment for pasteurization depends in a measure on the amount of cream handled, and on the method employed.

With the continuous or flash method, it is necessary to have a pasteurizer and cooler, as well as a forewarmer. The total cost of this equipment will vary from \$600 to \$800 for an averaged sized creamery.

When the vat method of pasteurization is used, there is little extra cost for equipment, providing the creamery is already equipped with the necessary ripeners for handling the cream received. It stands to reason, however, that a ripener will not last as long when used as a pasteurizer, because the expansion and contraction of all metal parts will surely affect the lasting qualities of the ripener, and from 20 to 30 per cent of the cost of the ripeners should be charged to pasteurization equipment. The ripeners should be of modern type and have large coil inlet and outlet, to insure rapid heating and cooling.

Size of Equipment.

The continuous pasteurizer should be large enough to handle the cream without crowding, and the cooler should be of ample capacity to cool the cream to 60 degrees F., or lower, as fast as it flows from the pasteurizer.

When pasteurizing with the vat method, it is generally advisable to use ripeners of 300 to 400 gallons capacity, as these will give better satisfaction than will larger ripeners.

Cost of Pasteurization.

It is difficult to determine to a certainty the exact cost of pasteurization, but it is safe to say that, under average creamery conditions, cream can be pasteurized at a cost of from eight to twenty-five cents per one hundred pounds of fat handled.

This cost depends in a measure on the amount of cream handled and equipment used, as well as on the efficiency of the power plant. From experiments carried on by the Dairy Division, U. S. Dept. of Agriculture, it appears that the cost of pasteurization is slightly higher with the continuous method than with the vat method.

Where a steam engine is used for power, the cost of pasteurization can be reduced by utilizing the exhaust steam in heating the cream.

A small amount of cream increases the cost of pasteurization, as does also a lack of heating and cooling capacity. If the power plant is too large or too small, or if it is not efficiently operated, there will be an increase in the cost.

Thin cream increases the cost of pasteurization, on account of the expense of heating and cooling a greater percentage of milk serum for each pound of fat handled.

In a large creamery, where there is already enough work for the men employed, it will be necessary to employ extra help if pasteurization is adopted, which would slightly increase the cost. It is poor economy to attempt to pasteurize without the necessary help, as it requires considerable attention if the best results are to be obtained.

Losses in Buttermilk.

The loss of fat in buttermilk, when churning pasteurized cream, is influenced by the acidity and the richness of the cream. There is also a variation in this loss due to different temperatures and methods employed by buttermakers. There

is less loss of fat in buttermilk when churning cream pasteurized while sweet than when churning raw cream. There is a greater loss of fat in the buttermilk when churning cream pasteurized while sour than when churning raw cream. Thin cream increases the loss of fat in the buttermilk, as do also imperfect methods of pasteurization. There is a slightly greater loss of fat in the buttermilk with the vat method than with the flash method of pasteurization.

The churning temperature of pasteurized cream should be from 2 to 5 degrees lower than that of raw cream. The lower temperature is also necessary to insure good body in the butter.

Pasteurized cream should always be held at churning temperature or lower for at least three hours before churning. If not, the body of the butter will be affected and there will be an excessive loss of fat in the buttermilk.

Pasteurizing Without Starter.

Where good starter milk can be secured, it is advisable to use a starter when pasteurizing, and yet there is little doubt but that the quality of cream can be improved even if no starter is used. When perfectly sweet cream is received, it is possible to pasteurize and produce a very fine piece of butter without the use of a starter, and if a creamery receives sweet cream and has a market for low acid butter, it may be advisable to pasteurize without using a starter. It is generally conceded by butter-makers, however, that a good starter should be used in connection with pasteurization, and it is advisable under most conditions to use a starter, in order to obtain the maximum benefit from pasteurization.

Pasteurizing cream will improve the keeping quality of butter, even if no starter is used, and when high acid cream is pasteurized there will be a slight improvement in the butter due to the acidity being reduced by pasteurization. There is little doubt, however, that in most instances it will be found profitable to use a good starter, even if a special price must be paid for the necessary milk.

Ripening the Cream.

With the flash method of pasteurization, the starter may be placed in the ripener, and the cream run directly from the cooler into the ripener. The ripener coil should be run off and on, so as to thoroughly mix the cream and starter, and thus assist in uniform ripening. When pasteurizing in the ripener, the cream should be cooled to 70 degrees F. before the starter is added, and then the cooling continued to the temperature at which the cream is left for ripening. When sour cream is handled, it is not advisable to develop more acid, but when the starter is added the cooling should be continued to churning temperature or lower.

We wish to caution buttermakers against high ripening, as it is a very dangerous practice. High ripening is often the cause of metallic, fishy or rancid flavors, and high acid butter does not possess the good keeping quality that is so essential from the consumer's standpoint. Past experiments also indicate beyond a doubt that butter made from low acid cream has better keeping quality when placed in cold storage than has butter from a high acid cream.

Points To Remember.

Pasteurization must be done right to be of any value.

The object of pasteurization is to make a more desirable and uniform product of better keeping quality.

Pasteurization does not make it possible to produce good butter from poor raw material.

Good results from pasteurization cannot be secured with unfavorable conditions.

Thin cream reduces the chances of successful pasteurization.

Pasteurization will not be successful without the necessary equipment and ample capacity.

Sufficient steam and power and a liberal supply of cold water are essential factors to be considered.

A skilled buttermaker is a necessity for successful pasteurization.

Some regularity in the method of cream delivery is essential.

Uniform temperatures are important.

A forewarmer should always be used with the flash method of pasteurization.

The proper speed of the ripener coil is important in vat pasteurization.

Rapid heating and cooling increases the efficiency of pasteurization and lessens the danger of curdling.

Large steam and water connections increase heating and cooling capacity.

Use of exhaust steam reduces the cost of pasteurization.

All sweet or all sour cream may be pasteurized without difficulty.

Curdling is due to pasteurizing sweet and sour cream without first mixing and equalizing the acidity.

Sweet and sour cream should be pasteurized separately when possible.

It is always advisable to strain cream before pasteurizing.

The cost of pasteurization is small when compared with the benefit derived.

Pasteurized cream should always be churned at a lower temperature than raw cream.

Pasteurized cream should always be held at a low temperature for several hours before churning.

Avoid high ripening, whether pasteurized or raw cream is handled.

A pasteurizer will not run itself; it requires constant attention.

Pasteurization increases the work in a creamery, and the necessary help should be furnished.

Pasteurization will do all that is claimed for it, if it is properly applied.

MEMBERSHIP LIST FOR 1916-1917.

A

AUSTIN, F. G., Effingham.
ALEXANDER, C. B., Chicago, Star
Union Line.
ALBRIGHT, A. R., Red Oak, R. 1.

ALBRIGHT, O. W., Scales Mound.
ANDERSON, M. H., Big Rock.
ASPENWALD, H. L., Freeport, R. 2

B

BALDSCHMIDT, WM., Freeport.
BARTH, A. W., Carbondale.
BELDERBACH, J. W., Carbondale.
BENJAMIN, J. L., Pana.
BLAZER, H. K., Dakotah.
BRYAN, JESSE, Carbondale.
BRYAN, W. J., Carbondale, R. F.
D. 1.
BORMAN, T. A., 224 8th Ave., La-
Grange.

BOST, G. W., Murphysboro.
BOUSKA, F. W., 208 S. LaSalle
St., Chicago.
BRYSON, FRANK, Elizabeth.
BRAUER, W. H., Winslow.
BRUBAKER, D. M., Freeport,
Box 142. Willow Brook Dairy
Farm.
BURKHOLM & McNEILL, Carter-
ville, R. 1.

C

CALLOWAY, ARCH, Taylorville.
CAPPS, W. LEE, Hinsdale (Nato-
ma Farms.)
CARPENTER, K. B., Mt. Carroll.
CARR, FRED, Aurora.
CAVEN, GEORGE, 136 W. Lake
St., Chicago.
CHAPMAN, J. C., Vienna.
CHASE, F. M., 538 S. Clark St.,
Chicago.
CHRISTIANSEN, ART., Camp
Point.
COBB, L., care W. H. Dexter Co.,
1219 S. Wabash Ave., Chicago.

COLLIER, N. B., Taylorville.
CLARK, H. G., Ullin.
COTE, H., Thompson.
COLLYER, F. P., care W. D. Col-
lyer Co., Chicago.
CONIGAN, E., Peoria, care Ameri-
can Milling Co.
COOPER, E. G., Streator.
COX, L. F., Thebes.
CREDICOTT, H. J., Freeport.
CRISSEY, SHERMAN, Marengo.
CURRIER, B., Freeport.

D

DAMGAARD, PETER, Bushnell.
DAHLER, F., Thomson, R. 6, Box
19.
DANIELSON, P., McConnell.
DENSMORE, HARRY, Charleston,
Box 295.

DIDDENS, GEO. B., German Val-
ley, R. R. 1.
DITTER, H. E., Flora.
DOLAN, N. H., 733 E. Marquette
St., Chicago.
DuBOSS, G. L., Cobden.
DUNKEL, GEO., Mt. Carmel.

E

EASTERLEY, H. G., Carbondale.
EBERSOL, E. T., Sears, Roebuck
& Co., Chicago.
ELLIOTT, W. L., Marion, R. F. D.
4.

ENGLE, A. H., Freeport, R. R. 3.
ETHERTON, D. M., Carbondale.
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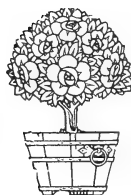
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NEXT ANNUAL CONVENTION

Illinois
State Dairymen's
Association

AT

Danville, Jan. 30, 31 and Feb. 1

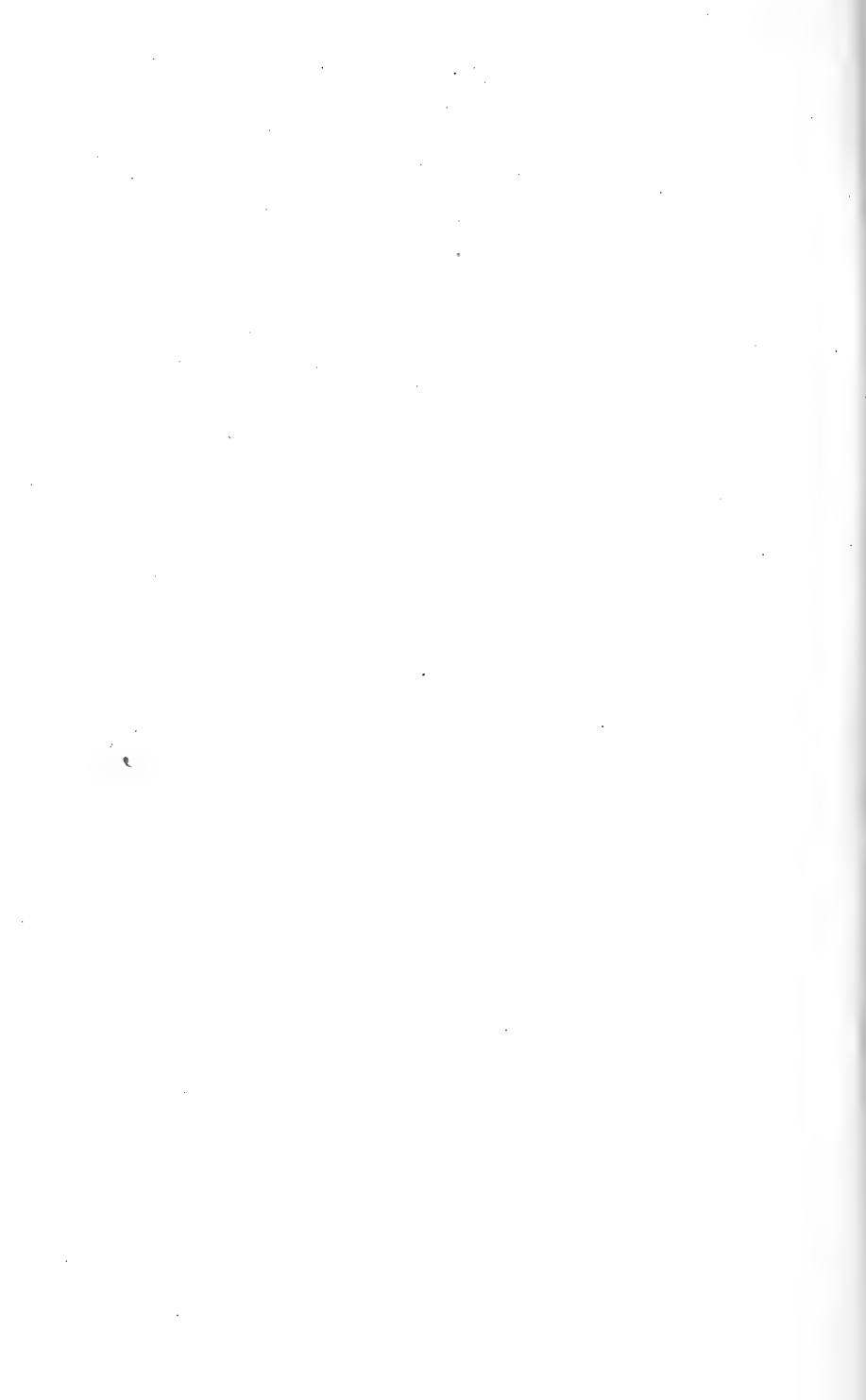
*Cattle Show to Be Made More of a
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Cash and Special Prizes for Dairy Cattle, Market Milk,
Butter, (both creamery and dairy), Twenty-four
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*Speakers Will Include Representatives of National and State Governments,
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